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MONTGOMERY WATSON

February 23, 1998

FEB 1998

Michael Bellot, Project Manager
United States Environmental Protection Agency, Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Re: Monitoring Well Assessment Report
Blackwell Forest Preserve Landfill
DuPage County, Illinois

Dear Mr. Bellot:

On behalf of the Forest Preserve District of DuPage County (FPD), we are pleased to submit the Monitoring Well Assessment Report for the Blackwell Landfill. This report provides integrity survey data and installation logs for the 29 monitoring wells and piezometers that are included in the Quarterly Groundwater Monitoring Program.

If you have any questions or comments about this report, please contact me at 630/691-5000.

Sincerely,

MONTGOMERY WATSON

Walter G. Buettner, P.E.
Project Manager

Enclosure

cc: Rick Lanham – Illinois Environmental Protection Agency
Kurt Lindland – Assistant Regional Counsel, U.S. EPA
Jerry Hartwig – Forest Preserve District of DuPage County
Kostas Dovantzis – Tetra Tech EM, Inc.

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2100 Corporate Drive
Addison, Illinois
60101

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MONITORING WELL ASSESSMENT REPORT

BLACKWELL FOREST PRESERVE LANDFILL SITE
DUPAGE COUNTY, ILLINOIS

Montgomery Watson File No. 1252008

Prepared For:

Forest Preserve District
DuPage County, Illinois

Prepared By:

Montgomery Watson
2100 Corporate Drive
Addison, Illinois 60101

February 1998

MONTGOMERY WATSON

MONITORING WELL ASSESSMENT REPORT

BLACKWELL FOREST PRESERVE LANDFILL SITE
DUPAGE COUNTY, ILLINOIS

Prepared For:

Forest Preserve District
DuPage County, Illinois

Prepared by: _____ 2/23/98
Judith M. Kinch
Project Geologist
Date

Approved by: _____ 2/23/98
Walter G. Buettner, P.E.
Project Manager
Date

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1.0 INTRODUCTION

Montgomery Watson was retained by the Forest Preserve District of DuPage County (FPD) to perform certain pre-design investigations at the Blackwell Landfill NPL Site (Site), located in DuPage County, Illinois (Figures 1 and 2). These investigations were required as part of the Administrative Order of Consent (AOC), U.S. EPA Docket No. V-W-96-C-341, between the U.S. EPA and the FPD. One of the objectives of the pre-design field investigations was to provide additional background water quality data for the long-term groundwater monitoring program. This report provides a summary of a two-year quarterly groundwater monitoring program developed for the Site, as well as the integrity surveys, well redevelopment, and new well installations conducted prior to the start of the two-year monitoring program.

2.0 SCOPE OF WORK

Specific recommendations for a two-year quarterly groundwater monitoring program were developed by Montgomery Watson (July 1997 Revised Predesign Report) and approved by U.S. EPA in an August 21, 1997 letter. The approved program included requirements for:

- Performing a monitoring well/piezometer integrity survey;
- Installing five new monitoring wells (one detection and four compliance wells);
- Groundwater quality monitoring in 13 detection monitoring wells located between the landfill and the FPD property boundary;
- Groundwater quality monitoring in 10 compliance monitoring wells located along the downgradient FPD property boundary; and
- Measuring groundwater levels in the 13 detection, 10 compliance, and six existing monitoring wells/piezometers.

2.1 SCOPE

Work to address the first two requirements listed above was conducted in phases. Phase I was completed in October 1996 and involved monitoring well/piezometer integrity surveys and redevelopment of wells/piezometers which were preliminarily selected for the proposed quarterly groundwater monitoring program. The objectives of the monitoring well/piezometer integrity survey were to identify redundant and unnecessary monitoring locations that could be eliminated from the quarterly groundwater monitoring program, and to document the integrity of existing wells/piezometers proposed for inclusion in the program. The results of these activities were provided in the July 1997 Revised Predesign Report which also included a reevaluation of the list of wells/piezometers preliminarily selected for inclusion in the groundwater monitoring program. The reevaluation resulted in the selection of some alternative wells/piezometers for the quarterly groundwater monitoring program.

Phase II, which is the subject of this report, was completed in September 1997 and involved additional monitoring well/piezometer integrity surveys and redevelopment of the alternative wells/piezometers selected in Phase I. In addition, five new monitoring wells were installed, developed, and surveyed. These new and existing wells form the compliance and detection monitoring network for the lower and upper aquifers beneath the Site. The wells/piezometers in the final quarterly groundwater monitoring program, including the new wells, are shown on Figures 3 and 4 and listed below.

DETECTION MONITORING WELLS

Glacial Outwash Aquifer Wells	Bedrock Wells
G107S	G128D
G117	G135
G118S	G140D
G123	G141D
G126	**G145 (new well)**
G127	
G129	
G130	

COMPLIANCE MONITORING WELLS

Glacial Outwash Aquifer Wells	Bedrock Wells
G122	G131D
G133S	G133D
G142 (new well)	G138
G143 (new well)	G139
G144 (new well)	**G146 (new well)**

WATER LEVEL WELLS

Glacial Outwash Aquifer Wells	Bedrock Wells
P2	G132D
G114	G134
G121	G137

3.0 PHASE II FIELD ACTIVITIES

The following sections document the Phase II monitoring well/piezometer integrity survey, the redevelopment of alternative existing wells, and the installation/development/surveying of the new wells.

3.1 MONITORING WELL/PIEZOMETER INTEGRITY SURVEY

The Phase II monitoring well/piezometer integrity survey was performed on September 23, 24, and 29, 1997, in accordance with the Field Sampling Plan for Pre-Design Investigation Activities (August 1996). The objective was to conduct inspections of seven existing wells/piezometers not previously evaluated during Phase I. The existing wells/piezometers that were inspected are:

- G132D (Bedrock Well)
- G134 (Bedrock Well)
- G137 (Bedrock Well)
- G130 (Glacial Outwash Aquifer Well)
- G131D (Bedrock Well)
- G135 (Bedrock Well)
- P2 (Glacial Outwash Aquifer Well)

Boring logs and well/piezometer construction details for these existing wells are provided in Appendices A and B, respectively.

The survey included inspections to evaluate whether the wells/piezometers were structurally sound, adequately protected, and capable of providing representative groundwater data. Specifically, the following tasks were performed during the survey:

- The condition of the lock, protective casing, and surface seal was noted.
- The presence/absence of material between the outer and inner casings was noted.
- The presence/absence of an outer casing weep hole was noted. A weep hole was drilled if not already present.
- The total well/piezometer depth was measured.
- A bailer was lowered to the bottom of the well/piezometer to check for obstructions.
- Each well/piezometer was photographed.

This information was recorded on monitoring well/piezometer well integrity evaluation forms, which are provided as Appendix C. The Phase II well/piezometer integrity survey results are summarized in Table 1. For completeness, the Phase I integrity survey results are also summarized in the table.

Problems or deficiencies, if any, were noted on each integrity survey form. The following table summarizes problems which were noted and subsequent corrective actions which were implemented:

Problem	Corrective Action
All wells/piezometers lacked a protective casing weep hole.	A weep hole was drilled in each protective casing.
G132D well cap did not fit.	G132D was equipped with a new well cap.
G130 and G131D have slightly heaved surface seals.	No action taken because the wells are in good condition otherwise.
G134D existing dedicated bailer is lodged inside well.	No action taken because this well is only used for water level measurements.
G134 surface seal has slightly subsided.	No action taken because the well is in good condition otherwise.

During the survey, it was also noted that wells G121 and G123 lacked well caps, and well G107S was not properly secured. To correct these deficiencies, G121 and G123 were equipped with new well caps and G107 was secured with a new chain and lock.

3.2 EXISTING MONITORING WELL REDEVELOPMENT

The following seven wells were redeveloped during Phase II:

- G107S (Glacial Outwash Aquifer Well)
- G118S (Glacial Outwash Aquifer Well)
- G121 (Glacial Outwash Aquifer Well)
- G127 (Glacial Outwash Aquifer Well)
- G130 (Glacial Outwash Aquifer Well)
- G131D (Bedrock Well)
- G135 (Bedrock Well)

These monitoring wells were redeveloped using a submersible pump. During redevelopment, the wells were periodically surged by alternately lifting and lowering the pump. Field parameters including pH, dissolved oxygen, specific conductance, turbidity, and temperature, were monitored during redevelopment using a flow-through cell. The more productive, outwash aquifer wells were purged until a minimum of seven well volumes was removed and, if practical, field parameters had stabilized. The less

productive, bedrock aquifer wells were purged until dry, allowed to recover, and then purged dry again.

In general, the monitoring wells were redeveloped until three consecutive field parameter measurements, to the extent practical, were within 10% of each other; turbidity values did not typically stabilize since purging was conducted at a high rate. A summary of well redevelopment results, including data from Phase I, is provided in Table 2. Well development forms, including those for Phase I, are presented as Appendix D.

3.3 NEW MONITORING WELL INSTALLATION AND DEVELOPMENT

Five new monitoring wells (G142, G143, G144, G145, and G146) were installed on the west side of the landfill in accordance with the July 1997 Revised Predesign Report. The locations of these new wells are shown on Figures 3 and 4.

Three of the wells, G142, G143, and G144, were screened in the upper outwash aquifer at depths ranging from 17 to 21 feet below ground surface (bgs). Each well was constructed from stainless steel riser and 10 feet of stainless steel screen, and was installed adjacent to an existing deep well, or a new deep well, to form a well pair. These new shallow wells supplement the downgradient compliance well network for the site, and will be sampled as part of the quarterly groundwater monitoring program.

The other two wells, G145 and G146, were screened in the lower bedrock aquifer at depths of 67 and 69 feet, respectively. Both wells were installed using double casing methods to minimize potential cross-contamination between the upper and lower aquifers, and each was constructed from stainless steel riser and 10 feet of stainless steel screen. G145 and G146 supplement the downgradient bedrock detection and compliance well network, respectively. Both wells will be sampled as part of the quarterly groundwater monitoring program.

Soil boring logs for the five new monitoring wells are provided as part of Appendix A. Monitoring well construction details are provided as part of Appendix B.

Each of the five new wells was developed after a minimum of 24 hours following installation. The wells were developed by hand bailing for approximately 30 minutes followed by purging using a submersible pump (Grundfos™). Surging was accomplished during development by periodically lifting and lowering the pump. Field parameters, including pH, dissolved oxygen, turbidity, temperature, and specific conductance were monitored during development. Each well was purged until a minimum of 10 well volumes, including the sand pack, was removed and, to the extent practical, until three consecutive field parameter measurements were within 10% of each other. Turbidity values did not stabilize due to the high purging rate.

Well development results are summarized in Table 2. Well development forms, which include field parameter measurements, are provided as Appendix D.

3.4 SURVEY

The locations and elevations of the new monitoring wells were surveyed by an Illinois licensed surveyor following development. In addition, the existing monitoring wells and piezometers that are part of the quarterly groundwater monitoring program were resurveyed to confirm their locations and elevations. Survey data are summarized in Table 3.

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Table 1

Monitoring Well/Piezometer Integrity Survey Results

October 1996 and September 1997

Blackwell Landfill NPL Site

DuPage County, Illinois

Well Number	Date Assessed	Well Diameter (inches)	Screen Length (ft)	Screen Type	TOIC Elevation (ft-msl)	Water Level (ft-TOIC)	Water Elevation (ft-msl)	Total Well Depth (ft-TOIC)	Aquifer Type	Locked and Secure	Protective Casing	Materi Betwee Casings	Surface Seal Defects	Well Casing Vent Hole	Kinking or Obstructions	Additional Comments
G-107S	Oct. 1996	4	*	*	708.60	15.12	693.48	40.4	Glacial Outw.	Yes	O.K.	None	None	No	None	Dedicated Bailer
G-114	Oct. 1996	4	*	*	709.40	16.50	692.90	30.0	Glacial Outw.	Yes	O.K.	None	None	No	None	Dedicated Bailer
G-117	Oct. 1996	4	*	*	707.44	14.92	692.52	30.0	Glacial Outw.	Yes	O.K.	None	None	No	None	
G-118S	Oct. 1996	4	*	*	711.33	17.90	693.43	22.9	Glacial Outw.	Yes	O.K.	None	Minor(1)	No	None	Dedicated Bailer
G-121	Oct. 1996	4	5	**	703.71	11.62	692.09	20.6	Glacial Outw.	No(2)	O.K.	None	None	No	None	Dedicated Bailer
G-122	Oct. 1996	4	5	**	706.52	14.44	692.08	25.6	Glacial Outw.	Yes	O.K.	None	None	No	None	Dedicated Bailer
G-123	Oct. 1996	4	5	**	707.77	15.30	692.47	22.0	Glacial Outw.	Yes	O.K.	None	None	No	None	Dedicated Bailer - Hornet nest in well(3)
G-126	Oct. 1996	4	10	PVC	704.50	12.36	692.14	19.3	Glacial Outw.	Yes	O.K.	None	None	No	None	Dedicated Bailer
G-127	Oct. 1996	4	10	PVC	706.66	14.60	692.06	20.9	Glacial Outw.	Yes	O.K.	None	None	No	None	Dedicated Bailer
G-128D	Oct. 1996	4	10	PVC	707.41	15.49	691.92	56.4	Dol. Bedrock	Yes	O.K.	None	Minor(1)	No	None	Dedicated Bailer
G-129	Oct. 1996	4	10	PVC	702.86	9.90	692.96	19.2	Glacial Outw.	Yes	O.K.	None	None	No	None	Dedicated Bailer
G-130	Sept. 1997	4	10	PVC	710.40	16.91	693.49	24.1	Glacial Outw.	Yes	O.K.	None	Minor(1)	No	None	Dedicated Bailer
G-131D	Sept. 1997	4	10(4)	None	706.03	14.45	691.58	54.1	Dol. Bedrock	Yes	O.K.	None	Minor(1)	No	None	Dedicated Bailer
G-131DD	Sept. 1997	4	10(4)	None	705.83	14.70	691.13	64.6	Dol. Bedrock	Yes	O.K.	None	None	No	None	Dedicated Bailer
G-132D	Sept. 1997	4	10(4)	None	725.99	28.10	697.89	84.5	Dol. Bedrock	Yes	O.K.	None	None	No	None	Dedicated Bailer; Well cap does not fit
G-133S	Oct. 1996	4	10	PVC	708.04	15.74	692.30	23.0	Glacial Outw.	Yes	O.K.	None	None	No	None	Dedicated Bailer
G-133D	Oct. 1996	4	10(4)	None	707.84	16.20	691.64	54.0	Dol. Bedrock	Yes	O.K.	None	None	No	None	Dedicated Bailer
G-134	Sept. 1997	4	30(4)	None	727.20	28.00	699.20	>100	Dol. Bedrock	Yes	O.K.	None	None	No	Yes(5)	Dedicated Bailer
G-135	Sept. 1997	4	10(4)	None	721.07	28.40	692.67	83.1	Dol. Bedrock	Yes	O.K.	None	Minor(6)	No	None	Dedicated Bailer
G-137	Sept. 1997	4	10	PVC	701.89	10.50	691.39	56.4	Dol. Bedrock	Yes	O.K.	None	None	No	None	Dedicated Bailer
G-138	Oct. 1996	4	10	PVC	708.69	16.83	691.86	56.2	Dol. Bedrock	Yes	O.K.	None	None	No	None	Dedicated Bailer
G-139	Oct. 1996	4	10	PVC	702.06	10.15	691.91	57.5	Dol. Bedrock	Yes	O.K.	None	None	No	None	Dedicated Bailer
G-140D	Oct. 1996	2	10.60	SS	705.55	13.66	691.89	60.7	Dol. Bedrock	Yes	O.K.	Sand	None	No	None	
G-141D	Oct. 1996	2	10.7	SS	708.15	16.41	691.74	63.8	Dol. Bedrock	Yes	O.K.	Sand	None	No	None	
P-2	Sept. 1997	2	5	PVC	694.59	7.78	686.81	14.9	Glacial Outw.	Yes	O.K.	None	None	No	None	

Notes:

* No information available

** Boring log indicates plastic screen

(1) Slight heave of surface seal

(2) Protective casing hinge broken

(3) Insect spray used to remove hornet nests.

(4) No screen: open borehole in bedrock

(5) Dedicated bailer lodged inside well

(6) Surface seal 4 - 6 inches below ground surface

SS = Stainless steel well screen

PVC = Polyvinyl chloride well screen

TOIC = Top of inner casing

msl = Mean Sea Level

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Table 2
Monitoring Well Development Summary
October 1996 and Fall 1997
Blackwell Landfill NPL Site
DuPage County, Illinois

			Well Development Field Parameters						
Well Number	Date New Well Developed	Date Existing Well Redeveloped	Well Volume (Gal)	Volume Purged (Gal)	pH	Specific Conduct. (umhos/cm)	Temp. Degree C	D.O. (mg/l)	Turbidity (NTU)
G-107S	NA	Sept. 1997	22.9	105	7.24	592	10.37	0.65	1.4
G-117	NA	Oct. 1996	24.4	240	7.54	574	12.50	2.13	0.02
G-118S	NA	Sept. 1997	5.9	41	6.65	439	11.64	1.17	19.6
G-121	NA	Oct. 1996	16.4	110	12.6	545	14.00	1.60	8.90
G-121	NA	Sept. 1997	11.4	80	7.27	276	13.06	2.20	1.4
G-122	NA	Oct. 1996	20.4	120	6.90	835	13.30	1.20	Clear
G-123	NA	Oct. 1996	12.3	85	9.51	601	14.00	2.12	2.20
G-126	NA	Oct. 1996	12.7	70	6.79	1120	14.00	1.48	Clear
G-127	NA	Oct. 1996	11.5	70	**	**	13.10	1.60	2.80
G-127	NA	Sept. 1997	8.3	59	6.91	332	11.97	0.29	3.2
G-128D	NA	Oct. 1996	40.6	240	8.76	730	12.40	2.04	10.10
G-129	NA	Oct. 1996	17.9	120	7.35	800	12.30	2.86	56*
G-130	NA	Sept. 1997	4.0	62	6.86	517	10.06	1.12	2.1
G-131D	NA	Nov. 1997	25	35	12.28	1493	12.33	0.78	48.1
G-131DD	NA	Sept. 1997	38.8	39	13.35	1323	13.41	6.79	41.6
G-133S	NA	Oct. 1996	13.3	75	7.10	1080	12.90	1.50	Clear
G-133D	NA	Oct. 1996	38.5	210	7.00	875	12.00	0.70	Clear
G-135	NA	Sept. 1997	42.5	65	8.04	618	11.89	0.11	4.3
G-138	NA	Oct. 1996	39.5	175	7.05	1025	11.20	2.60	2.46
G-139	NA	Oct. 1996	44.6	200	7.55	717	10.80	4.40	3.98
G-140D	NA	Oct. 1996	11	60	6.95	950	11.10	1.20	Clear
G-141D	NA	Oct. 1996	16	85	8.44	684	12.20	1.14	0.19
G-142	Nov. 1997	NA	5.9	65	7.18	1068	11.77	4.10	50.7
G-143	Oct. 1997	NA	6.8	180	6.92	931	12.63	0.00	23.8
G-144	Nov. 1997	NA	9.9	120	7.10	1068	12.36	0.16	241
G-145	Nov. 1997	NA	9.6	100	7.16	625	10.16	0.15	6.1
G-146	Oct. 1997	NA	22.8	160	7.09	395	10.52	0.00	9.1

Notes:
N.A. = Not Applicable
D.O. = Dissolved Oxygen
* = Turbidity units (NTU) 10 times scale factor
** = Equipment malfunction

Table 3
Monitoring Well/Piezometer Survey Data - November 1997
Blackwell Landfill NPL Site
DuPage County, Illinois

Deep Monitoring Wells

Well Designation	Reference Points			Notes
	North	East	TOIC	
G128D	-188.1	-1716.4	707.41	Detection Well
G131D	-685.4	-1725.3	706.03	Compliance Well
G133D	-622.9	-2085.4	708.10	Compliance Well
G135	878.7	-1552.4	721.07	Detection Well
G138	-254.5	-2249.2	708.69	Compliance Well
G139	555.6	-2477.8	702.22	Compliance Well
G140D	-284.6	-1293.2	705.71	Detection Well
G141D	-291.0	-1638.4	708.33	Detection Well
G145	240.7	-1757.8	711.18	Detection Well
G146	30.1	-2495.8	706.67	Compliance Well

Shallow Monitoring Wells

Well Designation	Reference Points			Notes
	North	East	TOIC	
G107S	-212.7	-805.1	708.60	Detection Well
G117	-296.3	-1629.7	707.44	Detection Well
G118S	564.9	-1730.8	711.33	Detection Well
G122	-689.7	-1563.2	706.52	Compliance Well
G123	-137.7	-1891.7	707.77	Detection Well
G126	-256.4	-1117.0	704.50	Detection Well
G127	-304.8	-1405.1	706.66	Detection Well
G129	169.5	-2035.2	702.86	Detection Well
G130S	791.4	-1732.4	710.40	Detection Well
G133S	-627.0	-2077.4	708.04	Compliance Well
G142	-243.2	-2244.8	709.17	Compliance Well
G143	30.7	-2502.1	706.56	Compliance Well
G144	548.1	-2485.2	701.88	Compliance Well

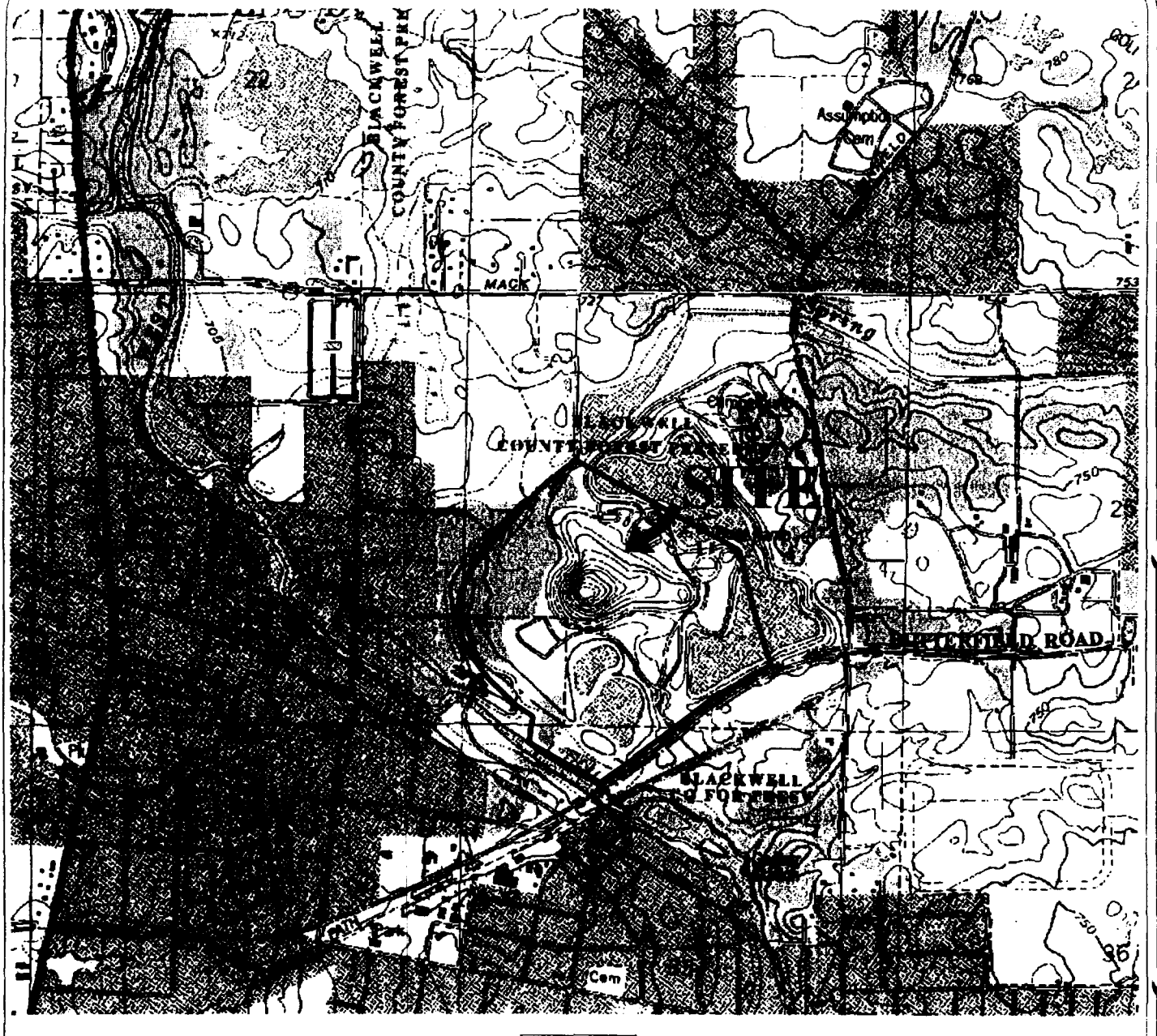
Water Level Wells

Well Designation	Reference Points			Notes
	North	East	TOIC	
P2	-1401.0	-1401.3	694.59	Glacial Outwash Aquifer Well
G114	1.0	-1683.8	709.40	Glacial Outwash Aquifer Well
G121	-568.1	-722.6	703.71	Glacial Outwash Aquifer Well
G132D	1188.1	-544.2	725.99	Bedrock Well
G134	661.5	309.6	727.20	Bedrock Well
G137	-1723.7	-1010.2	701.89	Bedrock Well

Notes

All depth measurements and elevations are in units of feet.

TOIC = Top of inner casing



north

0 2000 4000

SCALE IN FEET

Base map developed from the
Naperville, Illinois 7.5 Minute
U.S.G.S. Topographic Quadrangle Map
Dated 1993

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Chicago, Illinois

BLACKWELL LANDFILL NPL SITE
DUPAGE COUNTY, ILLINOIS
MONITORING ASSESSMENT REPORT

SITE LOCATION MAP
FIGURE 1

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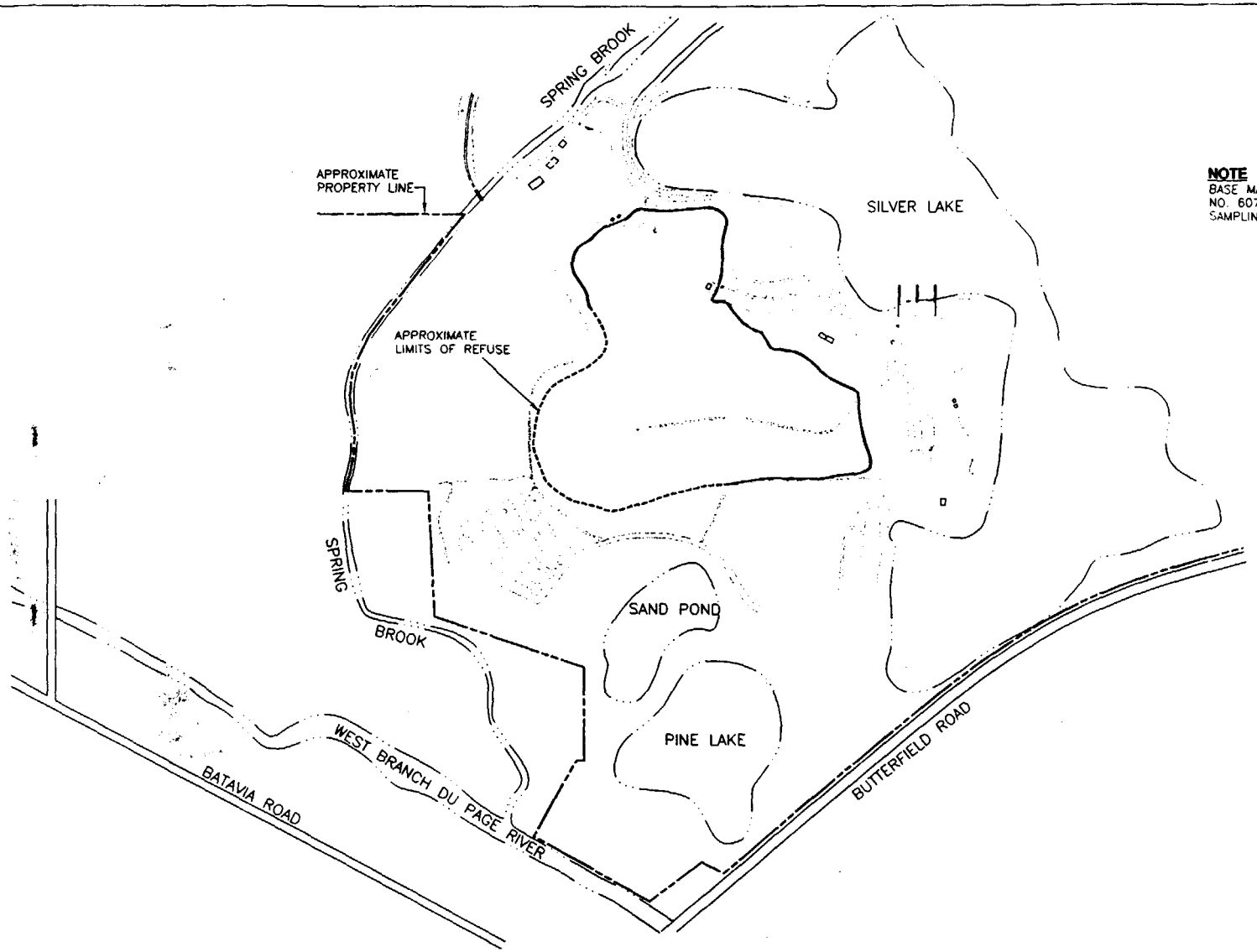

NOTE
BASE MAP DEVELOPED FROM WARZYN INC. DRAWING NO. 6072100-B47, "GROUNDWATER MONITORING WELL SAMPLING LOCATION MAP", DATED JULY 28, 1994

north

0 500 1000

SCALE IN FEET

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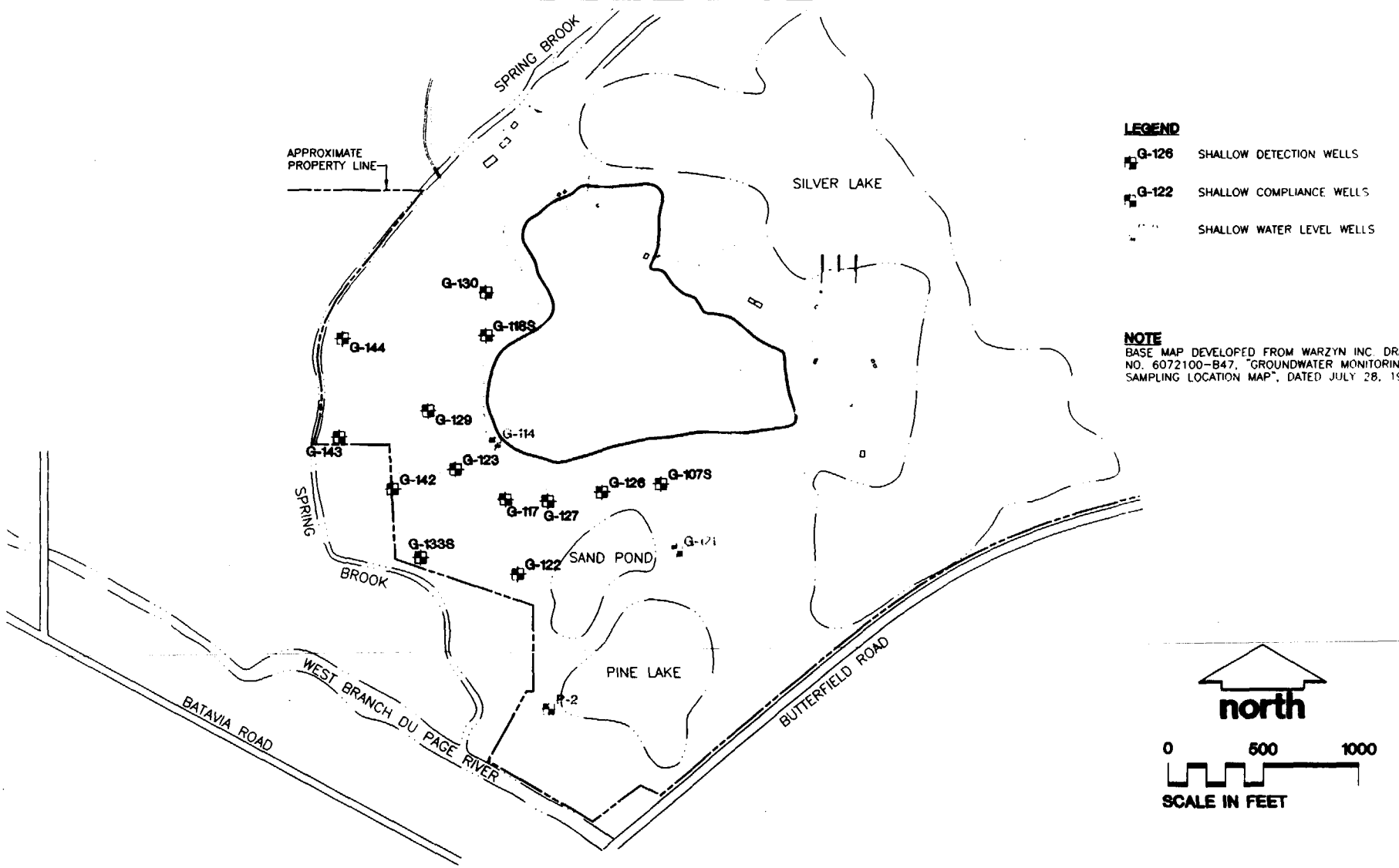
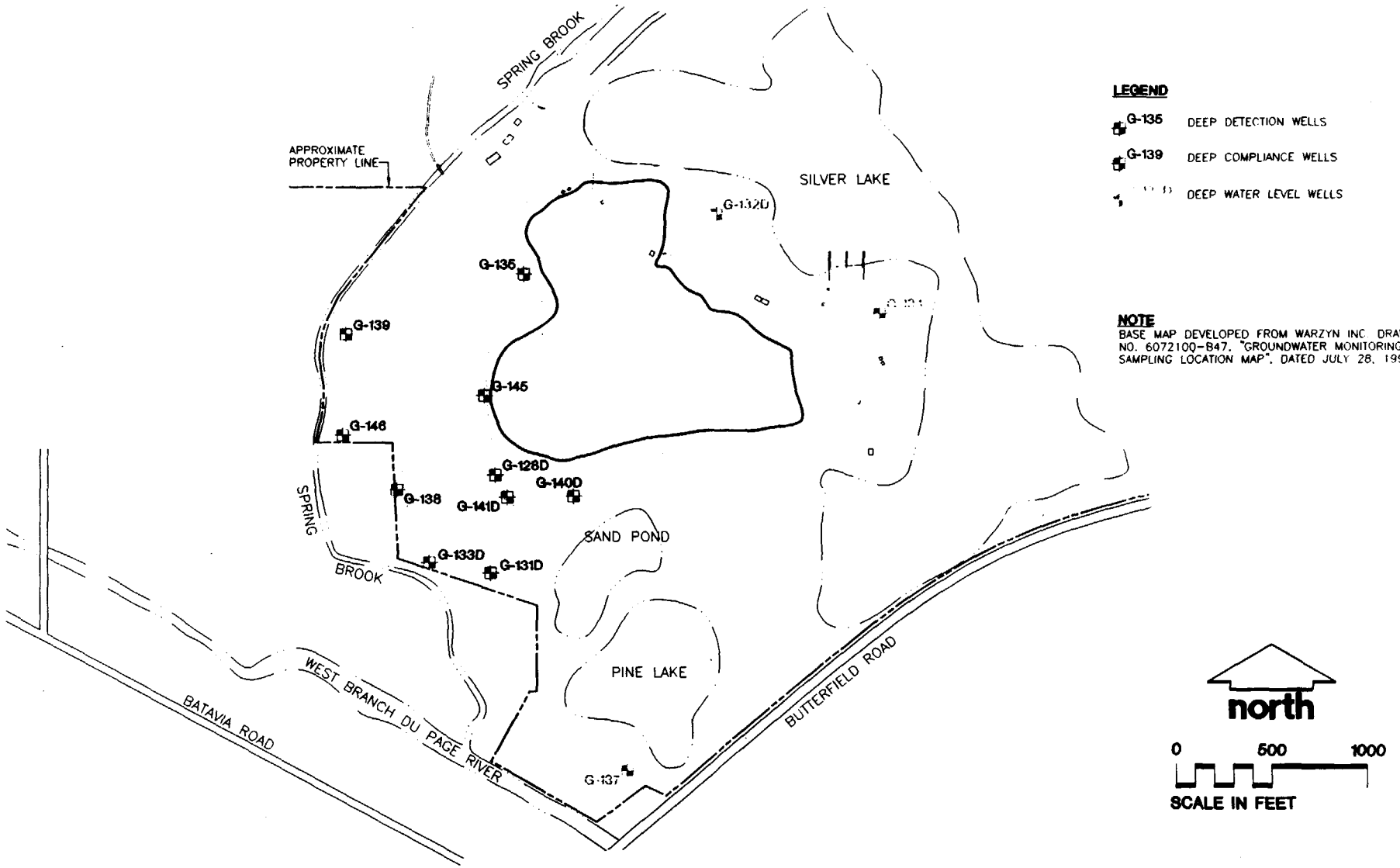
FIGURE 2
SITE FEATURES MAP
MONITORING WELL ASSESSMENT REPORT
BLACKWELL LANDFILL NPL SITE
DU PAGE COUNTY, ILLINOIS



MONTGOMERY WATSON
Chicago, Illinois

FIGURE 3
UPPER AQUIFER WELL AND PIEZOMETER LOCATIONS
MONITORING WELL ASSESSMENT REPORT
BLACKWELL LANDFILL NPL SITE
DU PAGE COUNTY, ILLINOIS



MONTGOMERY V. ATSON
Chicago, Illinois

FIGURE 4
BEDROCK AQUIFER WELL LOCATIONS
MONITORING WELL ASSESSMENT REPORT
BLACKWELL LANDFILL NPL SITE
DU PAGE COUNTY, ILLINOIS

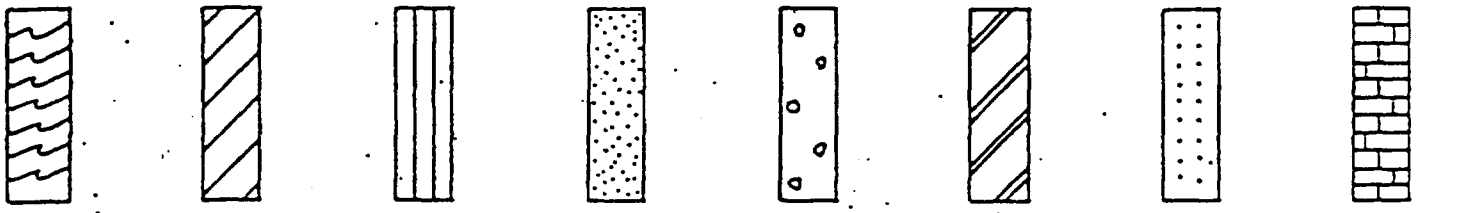
A

APPENDIX A

BORING LOGS

TESTING SERVICE CORPORATION

LEGEND FOR BORING LOGS



EAT AND GANIC SOIL | CLAY | SILT | SAND | GRAVEL | SHALE | SANDSTONE | LIMESTONE

T = THIN WALLED TUBE SAMPLE
SS = Split Spoon Sample
γ_D = Dry unit weight in pounds per cubic foot
A = Auger Sample
WC = In situ water content
N = Penetration Resistance in Blows per Foot - by driving 2" O.D. Split Spoon Sampler a distance of 12 inches with a 140-pound weight freely falling 30 inches
∇ = water level at end of boring
▼ = water level after elapsed time interval
∇=water level while Drilling
Qu= Unconfined compression strength in Tons per Square Foot
* = Denotes strength was based on pocket penetrometer measurements . Maximum range = 5.0

MATERIAL	SIZE RANGE
BOULDER	Over 8 inches
COBBLE	8 inches to 2-1/2 inches
Coarse GRAVEL	2-1/2 inches to 1 inch
Medium GRAVEL	1 inch to 3/8 inch
Small GRAVEL	3/8 inch to No. 4 sieve
Coarse SAND	No. 4 sieve to No. 20 sieve
Medium SAND	No. 20 sieve to No. 60 sieve
Fine SAND	NO. 60 sieve to No. 200 sieve
SILT or CLAY	Finer than No. 200 sieve

COHESIVE SOILS

Classification	Qu
Very Soft	0.35
Soft	0.35 to 0.59
Stiff	0.60 to 0.99
Tough	1.00 to 1.99
Very Tough	2.00 to 3.99
Hard	4.00 and over

COHESIONLESS SOILS

Classification	N
Very Loose	0 - 4
Loose	5 - 9
Firm	10 - 29
Dense	30 - 49
Very Dense	50 and over

MAJOR MODIFIER: SILTY, SANDY, CLAYEY, GRAVELLY

Modifying Term	Per Cent by Weight
Trace	1 - 10
Little	10 - 20
Some	20 - 35
And	35 - 50

TESTING SERVICE CORPORATION

UNIFIED CLASSIFICATION CHART

CRITERIA FOR ASSIGNING GROUP SYMBOLS AND GROUP NAMES USING LABORATORY TESTS [a]				SOIL CLASSIFICATION	
				GROUP SYMBOL	GROUP NAME [b]
COARSE-GRAINED SOILS more than 50 % retained on No. 200 sieve	GRAVELS More than 50 % of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS Less than 5 % fines [c]	$C_u \geq 4$ and $1 \leq C_c \leq 3$ [e]	GW	Well graded gravel [f]
			$C_u < 4$ and/or $1 > C_c > 3$ [e]	GP	Poorly graded gravel [f]
		GRAVELS WITH FINES More than 12 % fines [c]	Fines classify as ML or MH	GM	Silty gravel f,g,h
			Fines classify as CL or CH	GC	Clayey gravel f,g,h
	SANDS 50 % or more of coarse fraction passes No. 4 sieve	CLEAN SANDS Less than 5 % fines [d]	$C_u \geq 6$ and $1 \leq C_c \leq 3$ [e]	SW	Well-graded sand [i]
			$C_u < 6$ and/or $1 > C_c > 3$ [e]	SP	Poorly graded sand [i]
		SANDS WITH FINES More than 12 % fines [d]	Fines classify as ML or MH	SM	Silty sand g,h,i
			Fines classify as CL or CH	SC	Clayey sand g,h,i
FINE-GRAINED SOILS 50 % or more passed the No. 200 sieve	SILTS & CLAYS Liquid limit less than 50 %	Inorganic	PI > 7 and plots on or above "A" line [j]	CL	Lean clay [k,l,m]
			PI < 4 or plots below "A" line [j]	ML	Silt [k,l,m]
		Organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OL	Organic clay [k,l,m,n] Organic silt [k,l,m,n]
	SILTS & CLAYS Liquid limit 50 % or more	Inorganic	PI plots on or above "A" line	CH	Fat clay [k,l,m]
			PI plots below "A" line	MH	Elastic silt [k,l,m]
		Organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OH	Organic clay [k,l,m,p] Organic silt [k,l,m,q]
Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

a. Based on the material passing the 3-in (75-mm) sieve.

b. If field sample contained cobbles and/or boulders, add "with cobbles and/or boulders" to group name.

c. Gravels with 5 to 12 % fines require dual symbols
GW-GM well graded gravel with silt
GW-GC well graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay

d. Sands with 5 % to 12 % fines require dual symbols
SW-SM well graded sand with silt
SW-SC well graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

e. $C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

f. If soil contains $\geq$ 15 % sand, add "with sand" to group name.

g. If fines classify as CL-ML, use dual symbol GC-GM, SC-SM.

h. If fines are organic, add "with organic fines" to group name.

i. If soil contains $\geq$ 15 % gravel, add "with gravel" to group name.

j. If Atterberg Limits plot in hatched area, soil is a CL-ML, silty clay.

k. If soil contains 15 to 29 % plus No. 200, add "with sand" or "with gravel" whichever is predominant.

l. If soil contains $\geq$ 30 % plus No. 200, predominantly sand, add "sandy" to group name.

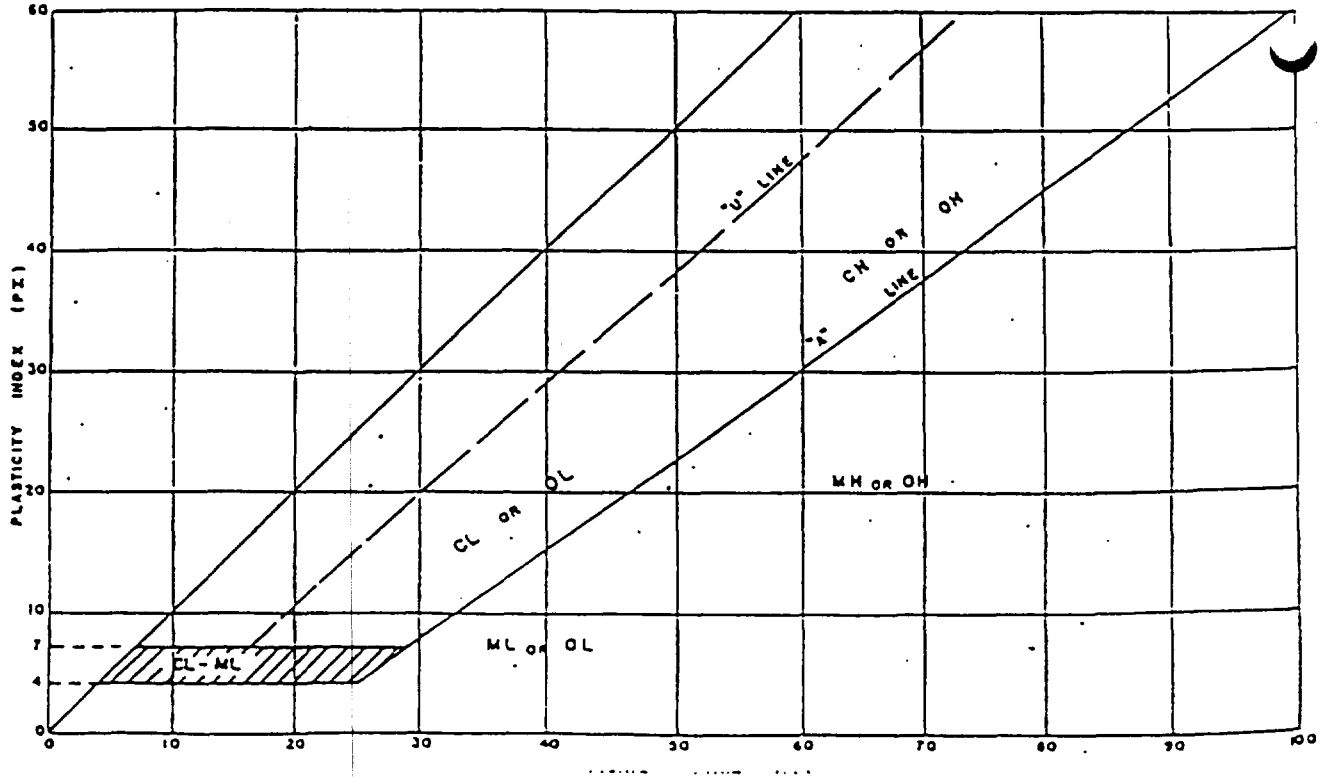
m. If soil contains $\geq$ 30 % plus No. 200, predominantly gravel, add "gravelly" to group name.

n. PI $\geq$ 4 and plots on or above "A" line.

o. PI $<$ 4 or plots below "A" line.

p. PI plots on or above "A" line.

q. PI plots below "A" line.



PROJECT TEST BORINGS & MONITORING STATIONS, BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DIST. OF DU PAGE COUNTY, 881 W. ST. CHARLES RD., LOMBARD

BORING Sta. 8 DATE STARTED 5-7-80 DATE COMPLETED 5-9-80 JOB 17,45

ELEVATIONS

GROUND SURFACE _____

END OF BORING _____

WATER TABLE

AT END OF BORING 13.0'

24 HOURS _____

WHILE DRILLING 14.5'

SHEET 1 OF

61075
61076

Distance Below Surface in Feet

SAMPLE NO.	TYPE	N	WC	Q_u	% DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
						0.5		FILL - Black clayey TOPSOIL
1a	SS	12	26.7					FILL - Brown silty CLAY, trace sand & gravel (CL)
1b			29.0					
2a	SS	7	25.8			4.0		Firm brown to light brown clayey SAND & GRAVEL, moist (SC)
2b								
3a	SS	24						
3b						7.0		
4a	SS	25						Firm brown to light brown silty fine to coarse SAND & small to large GRAVEL, very moist to wet at 14.5' (SM/GM)
4b								
5a	SS	10						
5b								
6a	SS	20						
6b								
7a	SS	16						
7b						15.0		
8a	SS	22						Firm to dense brown to light brown fine to coarse SAND & small to large GRAVEL, wet (SW/
8b								
9a	SS	40						
9b								
10a	SS	16	9.7	4.5*		20.0		Hard to very tough gray very silty CLAY, little sand & grave moist (CL); occasional clayey silt layers; boulder at 25'; 2" wet sand seam at 29.0'
10b								
11a	SS	38	8.1	4.5+*				
11b			9.4	4.5+*				
12a	SS	65/5"	**9.1	4.5+*				
12b			9.2	4.5+*				
13a	SS	38	9.2					
13b			8.3	4.5+*				
14a	SS	35	10.1	4.5+*				
14b			10.4	4.5+*				
15a	SS	40	9.3	4.5+*				
15b			12.0					
16a	SS	28	13.1	3.25*				
16b			12.6	4.25*				
17a	SS	34				33.5		
17b								Dense to very loose gray fine SAND, trace silt, wet (SP)
18a	SS	WOH						
18b								
19a	SS	8	14.6	1.75*		38.5		Tough gray very silty CLAY, l sand & gravel, moist
19b								
20a	SS	63/6"	**13.9	1.5*				

WOH - Weight of Hammer
** - Driving on Boulder
DRILL RIG NO. 72

TESTING SERVICE

*Approximate unconfined compre strength based on measurements a calibrated pocket penetrometer

PROJECT TEST BORINGS & MONITORING STATIONS, BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DIST. OF DU PAGE COUNTY, 881 W. ST. CHARLES RD., LOMBARD

BORING Sta. 8 con't DATE STARTED 5-7-80 DATE COMPLETED 5-9-80 JOB 17.458

G107S
G107D

ELEVATIONS

GROUND SURFACE _____

END OF BORING _____

WATER TABLE

AT END OF BORING 13.0'

24 HOURS _____

WHILE DRILLING 14.5'

SAMPLE NO.	TYPE	N	WC	Q_u	% DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
20b	SS	63/6"	12.7	2.5*				Very tough gray silty CLAY, little sand & gravel, moist (CL); with layers of silt & sand from 41.0' to 43.0'
21a b	SS	26				42.0		
22a b	SS	43	17.0	2.5*		44.5		Firm to dense gray fine to coarse SAND & small GRAVEL, wet (SW/GW) very tough gray silty clay layer at 43.0'
23a b	SS	30/2"				47.0		Very dense gray sandy SILT, trace clay, some large gravel, wet (ML)
								Weathered light gray DOLOMITE or BOULDER

End of Boring at 51.0'.

Bottom of shallow monitoring well was installed at 39.0' and sealed from 3.0' to ground surface.

Bottom of deep monitoring well was installed at a depth of 47.0' and sealed above 42.0'.

*-Approximate unconfined compression strength based on measurements with a calibrated pocket penetrometer.

Distance Below Surface in Feet

40 45 50 55 60 65 70 75 80

TESTING SERVICE CORPORATION

PROJECT TEST BORINGS & MONITORING STATIONS, BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DIST. OF DU PAGE COUNTY, 881 W. ST. CHARLES RD., LOMBARD

BORING Sta. 11+160 DATE STARTED 4-23-80 DATE COMPLETED 4-23-80 JOB 17,458

6114

ELEVATIONS

GROUND SURFACE _____

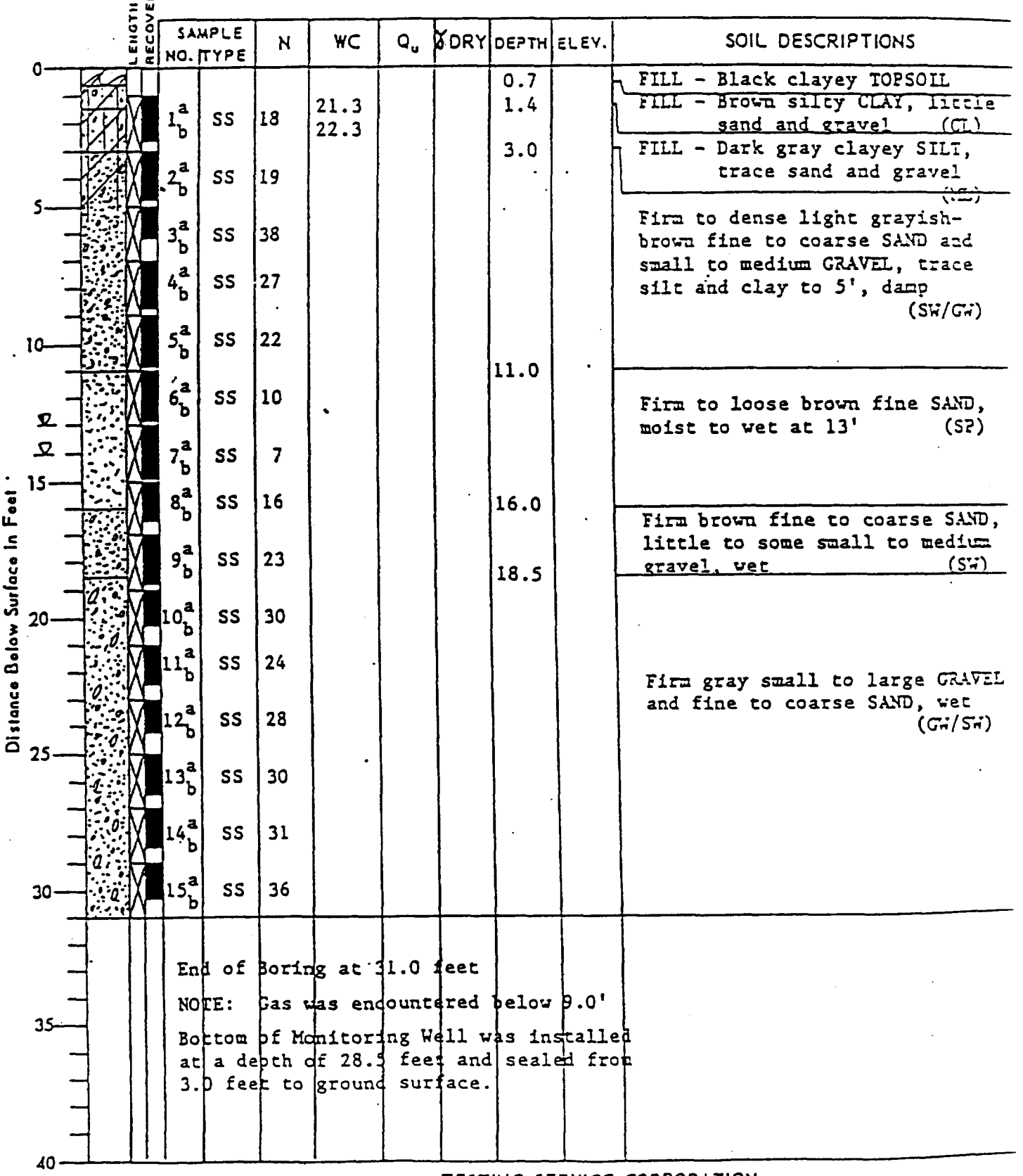
END OF BORING _____

WATER TABLE

AT END OF BORING -14.0'

24 HOURS _____

While Drilling -13.0'



LENGTH RECOVERY	SAMPLE NO.	TYPE	N	WC	Q_u	% DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.7		FILL - Black clayey TOPSOIL
	1^a_b	SS	18	21.3 22.3			1.4		FILL - Brown silty CLAY, little sand and gravel (CL)
	2^a_b	SS	19				3.0		FILL - Dark gray clayey SILT, trace sand and gravel (CL)
	3^a_b	SS	38						Firm to dense light grayish-brown fine to coarse SAND and small to medium GRAVEL, trace silt and clay to 5', damp (SW/GW)
	4^a_b	SS	27						
	5^a_b	SS	22						
	6^a_b	SS	10				11.0		Firm to loose brown fine SAND, moist to wet at 13' (SP)
	7^a_b	SS	7						
	8^a_b	SS	16				16.0		Firm brown fine to coarse SAND, little to some small to medium gravel, wet (SW)
	9^a_b	SS	23				18.5		
	10^a_b	SS	30						Firm gray small to large GRAVEL and fine to coarse SAND, wet (GW/SW)
	11^a_b	SS	24						
	12^a_b	SS	28						
	13^a_b	SS	30						
	14^a_b	SS	31						
	15^a_b	SS	36						

End of Boring at 31.0 feet

NOTE: Gas was encountered below 9.0'

Bottom of Monitoring Well was installed at a depth of 28.5 feet and sealed from 3.0 feet to ground surface.

TESTING SERVICE CORPORATION

DRILL RIG NO. 53

PROJECT TEST BORINGS & MONITORING STATIONS, BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DIST. OF DU PAGE COUNTY, 881 W. ST. CHARLES RD., LOMBAR

BORING Sta. 17 DATE STARTED 5-19-80 DATE COMPLETED 5-19-80 JOB 17.458

G117

ELEVATIONS

GROUND SURFACE _____

END OF BORING _____

WATER TABLE

AT END OF BORING _____

24 HOURS _____

While Drilling -13.0'

Distance Below Surface in Feet	LENGTH RECOVERY	SAMPLE NO.	TYPE	N	WC	Q_u	% DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
0										FILL - Black clayey TOPSOIL
		1^a_b	SS	88/10"				1.2		Very dense brown clayey small to large GRAVEL and fine to coarse SAND, occasional cobbles, moist (GC/CL)
		2	SS	100/4"						
5		3^a_b	SS	16	24.3	3.0*		5.0		
								6.0		Very tough brown silty CLAY, trace sand and gravel, moist (CL)
		4^a_b	SS	16	21.5					Firm brown to reddish-brown clayey medium to coarse SAND & small GRAVEL, moist (CL/GC)
								9.0		
10		5^a_b	SS	19						Firm to very dense brown fine to coarse SAND, trace clay, moist to wet at 13.0' (SW)
		6	SS	21						
▽		7^a_b	SS	14						
15		8^a_b	SS	66/10"						
		9^a_b	SS	43						
								19.0		
20		10^a_b	SS	8	19.1 20.2					Loose gray SILT, very moist (ML) with seams of silty clay
								21.0		
		11^a_b	SS	78						Very dense to firm gray small to large GRAVEL, fine to coarse SAND and COBBLES, wet (GW)
		12^a_b	SS	118						
25		13^a_b	SS	19						
		14^a_b	SS	49						
		15^a_b	SS	36	19.8					
30								30.5		Dense gray clayey SILT, very moist (ML)
										End of Boring at 31.0 feet
										Bottom of monitoring well was installed at a depth of 29.0 feet and sealed from 2.0 feet to ground surface.
35										
40										

*-Approximate unconfined compres strength based on measurements a calibrated pocket penetrometer

TESTING SERVICE CORPORATION

DRILL RIG NO. 72

PROJECT TEST BORINGS & MONITORING STATIONS, BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DIST. OF DU PAGE COUNTY, 881 W. ST. CHARLES RD., LOMBARD

BORING Sta. 13 DATE STARTED 5-13-80 DATE COMPLETED 5-13-80 JOB 17,450

G 1185
G 1187

ELEVATIONS

GROUND SURFACE _____

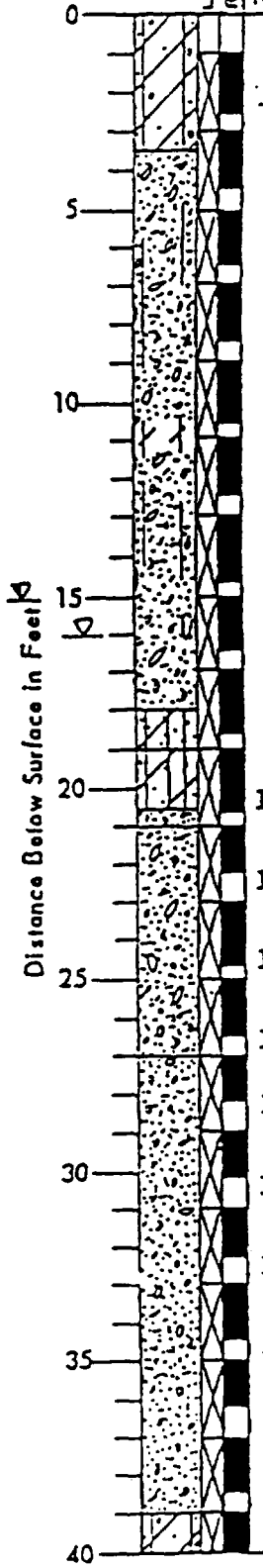
END OF BORING _____

WATER TABLE

AT END OF BORING -16.0'

24 HOURS _____

While Drilling -15.0'



SAMPLE NO.	TYPE	LENGTH RECOVERY	N	WC	Q_u	% DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
1a				21.5					FILL - Brown and gray silty CLAY, little sand and gravel (CL)
1b	SS		7	22.1					
2a				30.4			3.5		
2b	SS		22						Firm to dense grayish-brown fine to coarse SAND and small to large GRAVEL, trace silt to 15.0', moist to wet at 15.0' (SW/GW)
3a									
3b	SS		32						
4a									5" clayey sandy silt seam at 11.0
4b	SS		28						
5a									
5b	SS		12						
6a									
6b	SS		16						
7a									
7b	SS		23						
8a									
8b	SS		31						
9a							18.0		Firm gray SILT, little to some fi sand, trace clay, wet (ML)
9b	SS		17				19.0		
10a							20.5		Loose to firm gray clayey SILT, little fine sand, very moist (ML)
10b	SS		11				21.0		
11a									Firm reddish-brown fine to coars SAND, little gravel, wet (SW)
11b	SS		13						
12a									Firm brown fine to coarse SAND and small to large GRAVEL, wet (SW/GW)
12b	SS		20						
13a							27.0		
13b	SS		28						
14a									Firm brown fine to coarse SAND, little to trace small to medium gravel, wet (SW)
14b	SS		22						
15a									
15b	SS		23						
16a									
16b	SS		23						
17a									
17b	SS		34						
18a									
18b	SS		27						
19a									
19b	SS		51				39.0		Very tough grayish-brown silty CLAY, little sand and gravel, moist (CL)
20a	SS		26	22.5	2.75*				

TESTING SERVICE CORPORATION

Boring log continued

PROJECT TEST BORINGS & MONITORING STATIONS, BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DIST. OF DU PAGE COUNTY, 881 W. ST. CHARLES RD., LOMBA

BORING Sta. 13 DATE STARTED 5-13-80 DATE COMPLETED 5-13-80 JOB 17,4

ELEVATIONS

GROUND SURFACE

END OF BORING

WATER TABLE

AT END OF BORING -16.0'

24 HOURS

While Drilling -15.0'

1185
1180

SHEET 2 of

SAMPLE NO.	TYPE	N	WC	Q_u	% DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
20b	SS	16	13.1	4.5+				Hard to tough brownish-gray to gray silty CLAY, little to some sand and small gravel, moist (C
a			13.3	3.50				
21b	SS	33	13.2	4.25				
a			10.6	4.5+				
22b	SS	32	12.5	4.00				
a			13.8	1.50				
23b	SS	35	14.2	1.50				
a			14.2	3.75				
24b	SS	36	12.8	4.5+				
a			14.6	2.00		50.0		
25b	SS	43				51.0		Dense gray SILT, trace fine san and clay, very moist (ML)
a								
26b	SS	22	18.6	2.00				Layers of very tough gray silty moist (CL) and firm gray clayey very moist (ML) occasional sand silt seams
a			19.1	2.25		53.5		
27b	SS	16/10"				54.2		Dense gray medium to coarse SA and small GRAVEL, wet (SW); 3" very dense sandy silt seam at
								Weathered light gray DOLOMITE BOULDER

End of boring at 57.0'

Bottom of shallow monitoring well was installed at a depth of 21.0' and sealed from 4.0' to ground surface

Bottom of deep monitoring well was installed at a depth of 56.5' and sealed above 45.0'

*-Approximate unconfined compressi strength based on measurements a calibrated pocket penetrometer.

Distance Below Surface in Feet

40 45 50 55 60 65 70 75 80

TESTING SERVICE CORPORATION

PROJECT LEACHATE MONITORING WELLS, BLACKWELL FOREST PRESERVE, DUPAGE COUNTY, ILL.

CLIENT FOREST PRESERVE DIST. OF DUPAGE CO., P.O. BOX 2339, GLEN ELLYN, ILL.

BORING G-121 DATE STARTED 4-29-82 DATE COMPLETED 5-03-82 JOB 18,766

ELEVATIONS

GROUND SURFACE 702.2

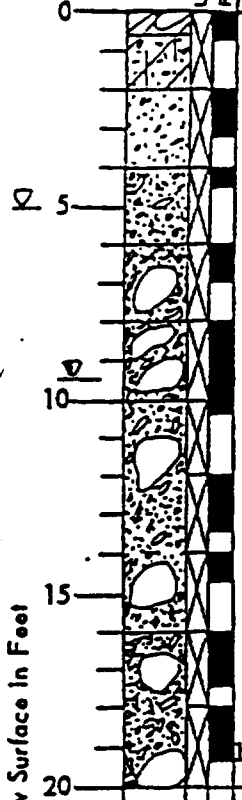
END OF BORING 682.2

WATER TABLE

AT END OF BORING CAVE @ - 5.0 FEET

24 HOURS

WHILE DRILLING - 9.5 FEET



SAMPLE NO.	TYPE	LENGTH RECOVERY	N	WC	Q_u	%DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
1	SS		16				0.6	701.6	Black clayey TOPSOIL
							2.0	700.2	Stiff brown sandy CLAY, some silt, some gravel, moist (CL)
2	SS		9				4.0	698.2	Loose brown fine SAND, little small gravel, damp (SP)
3	SS		33				6.0	696.2	Dense light brown small to large GRAVEL and medium to coarse SAND, damp (GW-SW)
4	SS		75				8.0	694.2	Very dense brown sandy (medium to coarse) small to large GRAVEL and COBBLES, a few boulders, damp (GW)
5	SS		48				10.0	692.2	Dense brown medium to coarse SAND and small to large GRAVEL, a few boulders, saturated (SW-GW)
6	SS		33						
7	SS		11						Dense to firm brown medium to coars SAND and small to large GRAVEL, a few boulders, saturated (SW-GW)
8	SS		29						
9	SS		21				16.0	686.2	Firm brown sandy coarse small to large GRAVEL and COBBLES, a few boulders, saturated (GW)
10	SS		16						

End of Boring at -20.0 Feet

NOTES: The bore hole for the monitoring well installation was made by the rotary method using revert. The well was backflushed with fastbreak and clear water.

Bottom of plastic screen: 20'
Top of plastic screen: 15'
Gravel backfill from 20' to 6'
Bentonite pellets from 6' to 4'
Backfill above bentonite

Well purged with submersible pump on May 4, 1982

TESTING SERVICE CORPORATION

DRILL RIG NO. 91

PROJECT LEACHATE MONITORING WELLS, BLACKWELL FOREST PRESERVE, DUPAGE COUNTY, ILL.

CLIENT FOREST PRESERVE DIST. OF DUPAGE CO., P.O. BOX 2339, GLEN ELLYN, ILL.

BORING G-122 DATE STARTED 4-29-82 DATE COMPLETED 4-30-82 JOB 18,766

ELEVATIONS

GROUND SURFACE 704.8

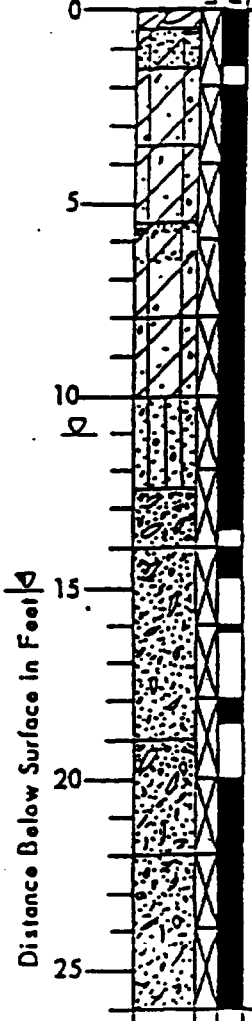
END OF BORING 678.8

WATER TABLE

AT END OF BORING -11.0 FEET

24 HOURS

WHILE DRILLING -15.0 FEET



SAMPLE NO.	TYPE	LENGTH RECOVERY	N	WC	Q_u	%DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.0	704.8	
1 a b	SS		8				0.5	704.3	FILL - Black clayey TOPSOIL
							1.5	703.3	FILL - Brown clayey fine to medium SAND, little silt, moist (SC)
2 a b	SS		19				3.5	701.3	FILL - Brown silty CLAY, little sand and gravel, moist (CL)
3 a b	SS		37				5.5	699.3	FILL - Brown, black and gray silty CLAY, little sand and gravel moist (CL)
4	SS		34						
5	SS		19				8.0	696.8	FILL - Brownish-gray silty CLAY, trace gravel, occasional sand seams, moist (CL) 3" sand and gravel seam @ -5.5'
6	SS		10				10.0	694.8	FILL - Brown sandy CLAY, some silt, little small gravel, moist (CL)
7	SS		31				12.5	692.3	Firm gray light brown and brown sandy SILT, some small to medium gravel, moist (ML)
8	SS		31				14.0	690.8	Dense gray medium to coarse SAND and small to large GRAVEL, very moist (SW-GW)
9	SS		26						
10	SS		20				19.0	685.8	Dense to firm gray coarse SAND and small to large GRAVEL, saturated (SW-GW)
11	SS		23						Firm brown coarse SAND and small to large GRAVEL, saturated (SW-GW)
12	SS		19				22.0	682.8	Firm to dense light brown fine coarse SAND and small to medium GRAVEL, saturated (SW-GW)
13	SS		31						

End of Boring at -26.0 Feet

NOTES: The bore hole for the monitoring well installation was made by the rotary method using revert. The well was backflushed with fastbreak and clear water.

Bottom of plastic screen: 25.5'
Top of plastic screen: 20.5'
Granular material caved around pipe to 15'

Well purged with submersible pump on May 4, 1982

TESTING SERVICE CORPORATION

DRILL RIG NO. 91

PROJECT LEACHATE MONITORING WELLS, BLACKWELL FOREST PRESERVE, DUPAGE COUNTY, ILL.

CLIENT FOREST PRESERVE DIST. OF DUPAGE CO., P.O. BOX 2339, GLEN ELLYN, ILL.

BORING G-123 DATE STARTED 4-29-82 DATE COMPLETED 5-03-82 JOB 18,766

ELEVATIONS

GROUND SURFACE 706.2

END OF BORING 682.2

WATER TABLE

AT END OF BORING -10.5 FEET

24 HOURS

WHILE DRILLING -12.0 FEET

Length Recovery	Sample No.	Type	N	WC	Q_u	% DRY	Depth	Elev.	Soil Descriptions
	1a	SS	39				0.5	705.7	FILL - Black clayey TOPSOIL
	1b						1.5	704.7	FILL - Gray small to large GRAVEL,
	2a	SS	27				2.0	704.2	some coarse sand, moist (GW)
	2b						3.5	702.7	FILL - Gray silty CLAY, trace gravel moist (CL)
	3	SS	53				5.5	700.7	FILL - Brown silty CLAY, little
	4	SS	93				6.0	700.2	gravel, moist (CL)
	5	SS	49						Very dense brown small to large GRAVEL, some coarse sand, damp (GW)
	6	SS	64						Very dense light brown large GRAVEL and COBBLES, little sand, damp (GP)
	7	SS	39				12.0	694.2	Very dense to dense light brown small to large GRAVEL, COBBLES, BOULDERS and fine to coarse SAND, damp (GW-SW)
	8	SS	33						Dense brown fine to coarse SAND and small to medium GRAVEL, saturate (SW-GW)
	9	SS	50/6"				16.0	690.2	
	10	SS	50				17.0	689.2	Very dense brown fine to coarse SAND and small to large GRAVEL, saturated (SW-GW)
	11a	SS	22						Dense to firm brown and gray medium to coarse SAND and small to large GRAVEL, saturated (SW-GW).
	11b						21.5	684.7	
	12a	SS	46				22.5	683.7	Firm gray SILT, trace sand, saturate (ML)
									Dense gray small to large GRAVEL and COBBLES, some coarse sand, saturated (GW)

Distance Below Surface in Feet: 0, 5, 10, 15, 20, 25, 30, 35, 40

End of Boring at -24.0 Feet

NOTES: The bore hole for the monitoring well installation was made by the rotary method using revert. The well was backflushed with fastbreak and clear water.

Bottom of plastic screen: 21.5'
Top of plastic screen: 16.5'
Granular backfill from 21.5' to 7'
Bentonite pellets from 7' to 5'
Backfill above bentonite

Well purged with submersible pump on May 4, 1982

TESTING SERVICE CORPORATION

DRILL RIG NO. 91

PROJECT BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DIST. OF DU PAGE CO., P. O. 2339, GLEN ELLYN, ILLINOIS

BORING G-126 DATE STARTED 6-18-84 DATE COMPLETED 6-18-84 JOB 20,530

ELEVATIONS

GROUND SURFACE 703.4

END OF BORING 683.4

LOCATION: 2 + 56 S
11 + 18 W

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -10.0 Feet

SAMPLE NO.	TYPE	N	WC	Q_u	% DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
1 A/B	SS	18	18.1 / 26.9			1.5	701.9	FILL: Dark brown clayey TOPSOIL (OH)
2 A/B	SS	45	19.9			3.0	700.4	FILL: Brown silty CLAY, some sand, trace gravel (CL)
3	SS	85						Very dense brown fine to coarse SAND and small to large GRAVEL, occasional cobbles and boulders, moist to wet; 4" silt seam encountered at 8'
4	SS	50/5"						
5	SS	50/6"						
						10.0	693.4	(SW-GW)
6	SS	24						Firm grayish-brown medium to coarse SAND, little gravel, wet (SP)
7	SS	13						
8	SS	15						
						16.0	687.4	
9	SS	20						Firm to dense gray and brown fine to coarse SAND and small to large GRAVEL, occasional thin silt seams, wet (SW-GW)
10	SS	42						

End of Boring at - 20.0 Feet

MONITORING WELL NOTES

1. Bore hole made by hollowstem auger method.
2. Bottom of 10' PVC screen at 17 3/4'.
3. Gravel pack from 17 3/4' to 4'.
4. Bentonite pellets from 4' to 1'.
5. Steel protective pipe concreted into place over well casing.

Distance Below Surface in Feet

TESTING SERVICE CORPORATION

PROJECT BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DIST. OF DU PAGE CO., P. O. 2339, GLEN ELLYN, ILLINOIS

BORING G-127 DATE STARTED 6-18-84 DATE COMPLETED 6-18-84 JOB 20,530

ELEVATIONS

GROUND SURFACE 705.0

END OF BORING 685.0

LOCATION: 3 + 05 S
14 + 05 W

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -11.0 Feet

SAMPLE NO.	TYPE	LENGTH RECOVERY	N	WC	Q_u	%DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
1	SS		61/9"	17.2			15"	703.8	FILL: Dark brown clayey TOPSOIL, trace sand and gravel (OH)
2A 2B	SS		27	17.7 –					FILL: Brown, gray and black silt CLAY, some sand, little gravel (CL)
3	SS		16	22.1					Clayey sand and gravel layer encountered at 3.5' (Sample 2B)
**4	SS		15	21.1			6.5	698.5	
5	SS		34				8.0	697.0	Brown silty CLAY, trace sand and gravel, moist (CL)
6	SS		32	21.2			10.0	695.0	Dense brown fine to coarse SAND and small to large GRAVEL, moist (SW/GW)
7A 7B	SS		21	22.3 –	1.75* –		12.0 13.0	693.0 692.0	Dense brown and gray SILT, trace clay and fine sand, very moist; occasional wet sandy silt seams (ML)
8	SS		22						Tough gray silty CLAY, moist (CL) occasional thin wet sand seams
9	SS		34						Firm to dense brown to brownish gray fine to coarse SAND and GRAVEL, wet (SW/GW)
10	SS		30						

Distance Below Surface in Feet

End of Boring at – 20.0 Feet

** Poor sample; driving on piece of gravel.

*-Approximate unconfined compressio strength based on measurements wi a calibrated pocket penetrometer.

MONITORING WELL NOTES

1. Bore hole made by solid auger method and reamed by rotary method using 6" bit and Revert.
2. Bottom of 10' PVC screen at 19'.
3. Backflushed with clean water.
4. Gravel pack from 19' to 8'.
5. Bentonite pellets from 8.0' to 2.0'.
6. Steel protective pipe concreted into place over well casing.

TESTING SERVICE CORPORATION

DRILL RIG NO

PROJECT BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DIST. OF DU PAGE CO., P. O. 2339, GLEN ELLYN, ILLINOIS

BORING G-128 DATE STARTED 6-19-84 DATE COMPLETED 6-22-84 JOB 20.530

ELEVATIONS

GROUND SURFACE 705.9

END OF BORING 649.9

LOCATION: 1 + 88 S
17 + 16 W

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -11 1/2 Feet

Distance Below Surface in Feet	Length Recovery	Sample No.	Type	N	WC	Q_u	% DRY	Depth	Elev.	Soil Descriptions
0		1 A/B	SS	20	27:7			7"	705.3	Black clayey TOPSOIL, trace sand and gravel (OH)
		2	SS	34				4.0	701.9	Firm to dense brown gravelly (small to large) fine to coarse SAND, moist (SW)
5		3	SS	27	18.6	2.5*		6.0	699.9	Very tough brown silty CLAY, little sand and gravel, moist (CL
		4	SS	51						
		5	SS	48						
10		6 A/B	SS	40						Dense to very dense brown fine to coarse SAND and small to large GRAVEL, a few cobbles, occasional boulders below 14', moist to wet (SW/GW)
		7	SS	41						
15		8	SS	71						
		9	SS	63				17.7	688.2	
		10 A/B	SS	62				18.8	687.1	Very dense gray SILT, trace clay and sand, very moist (ML)
20		11	SS	66						
		12	SS	58						Very dense to dense gray fine to coarse SAND, small to large GRAVEL and COBBLES, wet (SW/GW)
25		13	SS	46						
		14	SS	50						
		15	SS	16				28.2	677.7	
30		16	SS	48						Firm to very dense gray sandy SILT, some gravel, trace clay, moist (ML)
		17	SS	75						
35		18	SS	60						
		19	SS	43						
40		20	SS	32						

PROJECT BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DIST. OF DU PAGE CO., P. O. 2339, GLEN ELLYN, ILLINOIS

BORING G-128 cont. DATE STARTED 6-19-84 DATE COMPLETED 6-22-84 JOB 20,530

ELEVATIONS

GROUND SURFACE 705.9

END OF BORING 649.9

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -11 1/2 Feet

Distance Below Surface In Feet	LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Q_u	% DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
40		21	SS	21	8.3	3.5*				Firm to very dense gray sandy SILT, some gravel, trace clay, moist (ML)
		22A	SS	65				42.5	663.4	
		22B						43.5	662.9	Very dense gray silty GRAVEL, wet (GM)
45										BEDROCK (Dolomite)
50										
55										
										End of Boring at - 56.0 Feet
60										MONITORING WELL NOTES
										Boring initially advanced by solid auger, but was completed by the rotary method using a 6" b[illegible] and Revert.
65										3 WELLS INSTALLED
										G - 128D (Installed in original bore hole)
										1. Bottom of 10' PVC screen at 54.5'.
										2. Backflushed with clean water.
70										3. Gravel pack from 54.5' to 40'.
										4. Bentonite slurry from 40' to 2'.
										5. Steel protective pipe concreted into place over PVC well casing.
75										
80										

*-Approximate unconfined compression strength based on measurements with a calibrated pocket penetrometer.

DRILL RIG NO. 91

TESTING SERVICE CORPORATION

See Sheet 3 For Completion of Notes

PROJECT BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DIST. OF DU PAGE CO., P. O. 2339, GLEN ELLYN, ILLINOIS

BORING G-128 cont. DATE STARTED 6-19-84 DATE COMPLETED 6-22.84 JOB 20,530

ELEVATIONS

GROUND SURFACE 705.9

END OF BORING 649.9

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -11 1/2 Feet

LENGTH RECOVERY	SAMPLE NO. TYPE	N	WC	Q_u	% DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS

Distance Below Surface in Feet

G - 128I

1. New bore hole drilled by rotary method using 6" bit and Revert.
2. Bottom of 10' PVC screen at 29 3/4'.
3. Backflushed with clean water.
4. Gravel pack from 29 3/4' to 19'.
5. Bentonite pellets from 19' to 16'.
6. Bentonite slurry from 16' to 3'.
7. Steel protective pipe concreted into place over well casing.

G - 128S

1. New bore hole drilled by rotary method using 6" bit and Revert.
2. Bottom of 10' PVC screen at 17'.
3. Backflushed with clean water.
4. Gravel pack from 17' to 6'.
5. Bentonite pellets from 6' to 2'.
6. Steel protective pipe concreted into place over well casing.

PROJECT BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DIST. OF DU PAGE CO., P. O. 2339, GLEN ELLYN, ILLINOIS

BORING G - 129 DATE STARTED 6-25-84 DATE COMPLETED 6-25-84 JOB 20,530

ELEVATIONS

GROUND SURFACE 700.9

END OF BORING 682.9

LOCATION: 1 + 70 N
20 + 35 W

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -8.0 Feet

SAMPLE NO.	TYPE	LENGTH RECOVERY	N	WC	Q_u	%DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
1A	SS		9	29.9	-		0.5	700.4	Black to dark brown clayey TOPSOIL (OH)
1B	SS			22.2	2.0*				
2A	SS		38	30.5	1.25*		3.0	697.9	Very tough to tough brown silty CLAY, trace sand, gravel and organic, moist (CL)
2B	SS			21.9	-				
3	SS		8	21.5	-				
4	SS		9	22.4	-				Brown sandy silty CLAY, little gravel, moist (CL)
5	SS		75				8.0	692.9	Very dense to firm gray fine to coarse SAND and small to large GRAVEL, a few cobbles, wet; 3" clay seam at 13 1/2' (SW/GW)
6	SS		77						
7	SS		30						
8	SS		26						
9	SS		60						

Distance Below Surface In Feet

0, 5, 10, 15, 20, 25, 30, 35, 40

End of Boring at - 18.0 Feet

*-Approximate unconfined compression strength based on measurements with a calibrated pocket penetrometer.

MONITORING WELL NOTES

1. Bore hole initially advanced by solid auger, but was completed by the rotary method using a 6" bit and Revert.
2. Bottom of 10' PVC screen at 17.5'.
3. Backflushed with clean water.
4. Gravel pack from 17.5' to 6'.
5. Bentonite pellets from 6' to 2'.
6. Steel protective pipe concreted into place over well casing.

PROJECT BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DIST. OF DU PAGE CO., P. O. 2339, GLEN ELLYN, ILLINOIS

BORING G - 130 DATE STARTED 6-25-84 DATE COMPLETED 6-25-84 JOB 20,53

ELEVATIONS

GROUND SURFACE 708.6

END OF BORING 685.2

LOCATION: 7 + 92 N
17 + 31 W

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -14.0 Feet

SAMPLE NO.	TYPE	N	WC	Q_u	% DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
1 A	SS	12	56.2	–		0.7	707.9	Black to dark brown clayey TOPSOIL (OH)
1 B			22.9	4.25*				
2	SS	26	22.4	4.0*				Hard brown silty CLAY, trace sand and gravel, moist (CL)
3	SS	25				4.5	704.1	
4	SS	38						
5	SS	58						
6	SS	48						Firm to very dense brown medium to coarse SAND and small to large GRAVEL, damp to wet (SW/GW)
7	SS	85						
8	SS	88						
9	SS	18						
10	SS	24						
11	SS	34						
12	SS	71/11"						

Distance Below Surface In Feet

End of Boring at - 23.4 Feet

*-Approximate unconfined compressi strength based on measurements w a calibrated pocket penetrometer.

MONITORING WELL NOTES

1. Bore hole initially advanced by solid auger, but was completed by the rotary method using a 6" bit and Revert.
2. Bottom of 10' PVC screen at 23'.
3. Backflushed with clean water.
4. Gravel pack from 23' to 5'.
5. Bentonite pellets from 5' to 2'.
6. Steel protective pipe concreted into place over well casing.

TESTING SERVICE CORPORATION

PROJECT BLACKWELL FOREST PRESERVE: DU PAGE COUNTY, ILLINOIS

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE CO., P. O. BOX 2339, GLEN ELLYN, IL.

BORING G-131 DATE STARTED 4-1-85 DATE COMPLETED 4-8-85** JOB 21,288

ELEVATIONS

GROUND SURFACE 704.5

END OF BORING 661.5

LOCATION: 685.3 S
1725.2 W

** Date of well completion

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -10.5 Feet

SHEET 1 OF 2

DISTANCE BELOW SURFACE IN FEET

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Q_u	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.5	704.0	FILL: Black clayey TOPSOIL (OL)
1	SS		15	31.9					
2	SS		50/3"	25.9	(TOP)		2.5	702.0	FILL: Brown silty CLAY, some sand and gravel, trace topsoil (CL)
3	SS		53						FILL or DISTURBED: Brown silty fine to coarse SAND and small to large GRAVEL (SM/GM)
4	SS		70						
5	SS		50				8.5	696.0	
6	SS		42						Dense to firm brown fine to coarse SAND and small to medium GRAVEL, moist to wet (SW/GW)
7	SS		26						
8	SS		11						
9	SS		21				16.3	688.2	
10	SS		28						Firm to dense brown to gray fine to medium SAND, little to trace gravel, wet (SP)
11	SS		34						
12	SS		24				24.0	680.5	
13	SS		87						Very dense to firm gray medium to coarse SAND and small to large GRAVEL with cobbles and boulders, wet (SW/GW)
14	SS		29						
15	SS		72/8"						
16A/B	SS		34	14.2	3.25*		31.5	673.0	
17	SS		53	16.6	4.25*				Very tough to hard gray silty CLAY, little sand and gravel, moist (CL)
18	SS		44				35.0	669.5	Dense to firm layers of gray fine SAND and SILT, trace gravel, moist (SP,ML)
19A/B	SS		26				38.0	666.5	
20A	SS		47						Firm to dense gray silty SAND, some gravel, moist (SM)

PROJECT BLACKWELL FOREST PRESERVE, DU PAGE COUNTY, ILLINOIS

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE CO., P. O. BOX 2339, GLEN ELLYN, IL

BORING G-131 Cont. DATE STARTED 4-1-85 DATE COMPLETED 4-8-85** JOB 21,288

ELEVATIONS

GROUND SURFACE 704.5

END OF BORING 661.5

LOCATION: 685.3 S, 1725.2 W

** Date of well completion

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING: -10.5 Feet

Distance Below Surface In Feet	LENGTH RECOVERY	SAMPLE NO.	TYPE	N	WC	Q_u	% DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
40	8.5/10	20B	SS	47						Firm to dense gray silty SAND, some gravel, moist (SM)
		21	SS	50/3"						
45										BEDROCK: DOLOMITE, weathered near top
50										
										End of Boring at -53.0 Feet
55										
60										
65										
70										
75										
80										

DRILLING AND MONITORING WELL INSTALLATION NOTES

TWO WELLS INSTALLED IN BEDROCK:

Original pilot hole sampled and drilled by rotary method using Revert and 3 3/4" bit. A second hole was drilled by same method. Both holes were reamed with an 8" bit to the desired depth. 4" PVC riser pipe was installed in each hole. Cement grout with bentonite was pumped through drill rod lowered to the bottom of the hole. The entire annular space plus inside of bottom of PVC pipe was filled with grout. After allowing several days for the grout to set, the holes were advanced deeper into rock with a 3 3/4" bit. The open hole (in rock) and casing for each well was flushed with Fastbreak and clean water. A steel protector pipe was concreted into place over each well.

G-131D

1) Bottom of 8" hole and PVC casing: 43'
2) Bottom of uncased open hole: 53'

G-131DD

1) Bottom of 8" hole and PVC casing: 53'
2) Bottom of uncased open hole: 63'

*-Approximate unconfined compress strength based on measurements a calibrated pocket penetrometer.

TESTING SERVICE CORPORATION

DRILL RIG NO. 91

PROJECT BLACKWELL FOREST PRESERVE: DU PAGE COUNTY, ILLINOIS

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE CO., P. O. BOX 2339, GLEN ELLYN, IL.

BORING G-132 DATE STARTED 4-3-85 DATE COMPLETED 4-9-85** JOB 21,288

ELEVATIONS

GROUND SURFACE 724.7

END OF BORING 631.7

OCATION: 1187.9 N
544.5 W

** Date of well completion

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -23.0 Feet.

SHEET 1 OF 3

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Q_u	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.7	724.0	FILL: Black clavey TOPSOIL (OL)
	1	SS	NO RECOVERY				1.5	723.2	FILL: BOULDERS and COBBLES
	2	SS	55						Very dense to firm brown silty SAND and small to large GRAVEL, few cobbles and boulders, little to some clay, moist to wet (SM/GM)
	3	SS	53						
	4	SS	64						
	5	SS	62						
	6	SS	51						
	7	SS	78						
	8	SS	36						
	9	SS	43						
	10	SS	44						
	11	SS	42						
	12	SS	27						
							24.5	700.2	
	13	SS	27						Firm brown fine to coarse SAND and small GRAVEL, saturated (SP)
	14 A/B	SS	50				27.5	697.2	
	15	SS	47						Dense brown fine sandy SILT, occasional small gravel, saturated (ML)
							30.2	694.5	
	16	SS	24	16.3	2.75*				Tough to hard gray silty CLAY, trace to little sand and gravel moist (CL)
	17	SS	42	19.5	2.5*				
	18	SS	32	20.3	2.25*				(6" COBBLE - 32' - 32 1/2')
	19	SS	49	24.7	1.0*				
	20	SS	18	16.8	2.5*		38.5	686.2	Hard gray very silty CLAY, some sand and gravel, moist (CL/ML)

PROJECT BLACKWELL FOREST PRESERVE: DU PAGE COUNTY, ILLINOIS

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE CO., P. O. BOX 2339, GLEN ELLYN, IL.

BORING G-132 Cont. DATE STARTED 4-3-85 DATE COMPLETED 4-9-85** JOB 21,288

ELEVATIONS

GROUND SURFACE 724.7

END OF BORING 631.7

LOCATION: 1187.9 N 544.5 W

** Date of well completion

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING: -23.0 Feet

Distance Below Surface in Feet	LENGTH RECOVERY	SAMPLE NO.	TYPE	N	WC	Q_u	%DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
40		21	SS	39	10.6	4.5+*				Hard gray very silty CLAY, some sand and gravel, moist (CL/ML)
		22	SS	59	10.4	4.5+*				
45		23	SS	41	12.9	4.25*				(COBBLE - 46' - 46 1/2')
		24	SS	46	11.3	3.0*		46.5	678.2	Hard gray silty CLAY, trace sand and gravel, moist (CL)
		25	SS	49	14.9	3.5*				
50		26 A/B	SS	36/11	25.2	3.75*		50.8	673.9	
								52.3	672.4	Very dense gray SILT, little to some fine sand, saturated (ML)
		27	SS	40	19.6	3.0*				
55		28	SS	51	12.7	3.25*				
		29	SS	34	12.2	2.25*				Very tough to hard gray silty CLAY, trace sand and gravel, moist (CL)
		30	SS	32	13.0	2.75*				
60		31	SS	30	13.2	2.75*				(Thin sand layer - 53 1/2' to 53 3/4')
		32	SS	38						
65		33 A/B	SS	66	10.7	2.25*		64.5	660.2	
		34	SS	86/10						Dense brown gray fine sandy SILT, little gravel, moist
		35	SS	65/5						(3" sand and gravel layer between 63 3/4' to 66')
70		36	SS	100/4				70.8	753.9	
75										BEDROCK: Gray DOLOMITE
80										

TESTING SERVICE CORPORATION

DRILL RIG NO. 91

BORING LOG CONTINUED

PROJECT BLACKWELL FOREST PRESERVE: DU PAGE COUNTY, ILLINOIS

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE CO., P. O. BOX 2339, GLEN ELLYN, IL

BORING G-132 Cont. DATE STARTED 4-3-85 DATE COMPLETED 4-9-85** JOB 21,288

ELEVATIONS

GROUND SURFACE 724.7

END OF BORING 631.7

LOCATION: 1187.9 N, 544.5 W

** Date of well completion

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -23.0 Feet

SHEET 3 OF 3

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Q_u	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
80										
85										BEDROCK: Gray DOLOMITE
90										
95										End of Boring at -93.0 Feet
100										
105										
110										
115										
20										

DRILLING AND MONITORING WELL INSTALLATION NOTES FOR G-132D & G-132DD:

Original pilot hole was drilled and sampled by rotary method using 3 3/4" bit and Revert to a depth of 73'. A second hole was drilled from 0' to the NW by the same method to a depth of 83'. Both holes were reamed with an 8" bit. 4" solid PVC riser pipe was installed in each hole. Cement grout with bentonite was pumped through drill rod lowered to the bottom of the hole. The entire annular space plus inside of bottom of PVC pipe was filled with grout. After allowing several days for grout to set, the holes were advanced deeper into rock with a 3 3/4" bit. The open hole (in rock) and casing for each well was flushed with clean water. A steel protector pipe was concreted into place over each well.

G-132D: Bottom of cased well: 73'
Bottom of open hole: 83'

G-132DD: Bottom of cased well: 83'
Bottom of open hole: 93'

*-Approximate unconfined compression strength based on measurements wit a calibrated pocket penetrometer.

PROJECT BLACKWELL FOREST PRESERVE: DU PAGE COUNTY, ILLINOIS

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE CO., P. O. BOX 2339, GLEN ELLYN, IL

BORING G-133 DATE STARTED 4-9-85 DATE COMPLETED 4-16-85** JOB 21,28

** Date of well completion

ELEVATIONS

GROUND SURFACE 706.0

END OF BORING 633.0

LOCATION: 614.5 S, 2089.7 W

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -12.5 Feet

SHEET 1 OF 3

DISTANCE BELOW SURFACE IN FEET

SAMPLE NO.	SAMPLE TYPE	N	WC	Q_u	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
1	SS	19	30.7	2.5*				FILL: Brown to dark brown silt CLAY, little sand and gravel, moist (CL)
2A	SS	28	14.7			2.5	703.5	
2B								
3	SS	42						Firm to very dense brown fine to coarse SAND and small to medium GRAVEL mixed with a little brown clay between 2.5' 3.5', moist to saturated at 12.5' (SP)
4	SS	30						
5	SS	43						
6	SS	58						
7	SS	57						
8	SS	35						
						16.2	689.8	
9	SS	35						Firm to very dense brown and gray fine to coarse SAND and small gravel, saturated (SP)
10	SS	26						
11	SS	25						
12	SS	27						
13	SS	50/5						
						26.0	680.2	
14	SS	37						Dense to very dense gray medi to coarse SAND and small to large GRAVEL, occasional cobb little to some silt and clay (SP-GP)
15	SS	52						
16	SS	46				30.2	675.8	
17A	SS	47				33.2	672.8	Dense brownish grav firm SAND little silt, saturated (SM)
17B								
18	SS	48						Dense to very dense gray silt SAND, little gravel, saturate (SM)
						36.0	670.0	
19	SS	71						Very dense gray sandy SILT, little gravel, trace clay, mo (ML)
20	SS	50/6						

PROJECT BLACKWELL FOREST PRESERVE: DU PAGE COUNTY, ILLINOIS

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE CO., P. O. BOX 2339, GLEN ELLYN, IL.

BORING G-133 DATE STARTED 4-9-85 DATE COMPLETED 4-16-85** JOB 21,288

** Date of well completion

ELEVATIONS

GROUND SURFACE 706.0

END OF BORING 633.0

LOCATION: 614.5 S
2089.7 W

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING: -12.5 Feet

Distance Below Surface in Feet	LENGTH RECOVERY	SAMPLE NO.	TYPE	N	WC	Q_u	% DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
40		21A	SS	100/10"				40.8	665.2	Very dense gray sandy SILT, little gravel, trace clay, moist (ML)
		21B								
45		22	SS	50/5"						
50										BEDROCK: Gray DOLOMITE
55										
60										
65										
70										
75				End of Boring at -73.0 Feet						
80										

*-Approximate unconfined compression strength based on measurements wit a calibrated pocket penetrometer.

PROJECT BLACKWELL FOREST PRESERVE: DU PAGE COUNTY, ILLINOIS

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE CO., P. O. BOX 2339, GLEN ELLYN, IL.

BORING G-133 DATE STARTED 4-9-85 DATE COMPLETED 4-16-85** JOB 21.288

** Date of well completion

ELEVATIONS

GROUND SURFACE 706.0

END OF BORING 633.0

LOCATION: 614.5 S
2089.7 W

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -12.5 Feet

SHEET 3 OF 3

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Q_u	%DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS

DISTANCE BELOW SURFACE IN FEET

80
85
90
95
100
105
110
115
120

DRILLING AND MONITORING WELL INSTALLATION NOTES:

One Well Installed in Outwash Material

G-133S: Borehole was reamed with 8" rotary bit using Revert. The bottom of the 10' PVC screen was installed at 21.0'. Gravel packed from 21.0' to -9.0 feet. The annular space was sealed with bentonite pellets from -9.0 feet to -3.0 feet. A steel protector casing was concreted into place over the PVC well casing.

Two Wells Installed in Bedrock

Original pilot hole sampled and drilled by rotary method using Revert and 3 3/4" bit. A second hole was drilled by the same method. Both holes were reamed with an 8" bit to the desired depth. 4" PVC rise pipe was installed in each hole. Cement grout with bentonite was pumped through the drill rod lowered to the bottom of the bore hole. The entire annular space plus inside the lower portion of the PVC pipe was filled with grout. After allowance of several days for the grout to set, the holes were advanced deeper into rock with a 3 3/4" core barrel. The open hole (in rock) and the casing for each well were flushed with clean water. A steel protector casing was concreted into place over each well.

G-133D:

1). Bottom of 8" hole and PVC Casing: 43'

2). Bottom of uncased open hole: 53'

G-133DD:

1). Bottom of 8" hole and PVC casing: 53'

2). Bottom of uncased open hole: 73'

PROJECT BLACKWELL FOREST PRESERVE: DU PAGE COUNTY, ILLINOIS

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE CO., P. O. BOX 2339, GLEN ELLYN, IL.

BORING G-134 DATE STARTED 4-11-85 DATE COMPLETED 4-17-85 JOB 21,288

ELEVATIONS

GROUND SURFACE 725.8

END OF BORING 654.8

LOCATION: 661.3 N
310.1 E

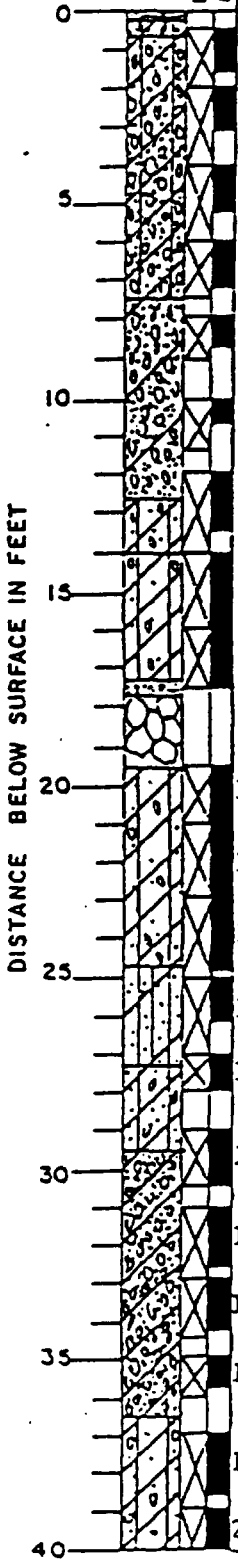
WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -24.96 Feet

SHEET 1 of 3



SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	q_u	γDRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.3	725.5	
1	SS		26				0.7	725.1	FILL: Black clayey TOPSOIL, little sand
2	SS		30						FILL: Dark brown silty CLAY, little sand and gravel, moist (CL)
3	SS		100						FILL: Brown fine to coarse SAND and small to large GRAVEL mixed with brown silty clay, moist (SC)
4	SS		78				7.5	718.3	
5	SS		50/5"						FILL: Brown fine to coarse SAND and small to medium GRAVEL little clay, moist (SC)
6	SS		50/4"						
7 A/B	SS		53	14.3	4.5*		12.8	713.0	
							14.0	711.8	Very tough to hard brown silty CLAY, little sand and gravel, moist (CL)
8	SS		45	11.6	4.5+*				
9 A/B	SS		43	11.4	4.5+*				Hard gray silty CLAY, trace sand and gravel, moist (CL)
				-	-		17.5	708.3	
							17.8	708.0	Dense gray fine to coarse SAND and small to large GRAVEL, saturated (SW)
							19.5	706.3	BOULDER
10	SS		31	17.9	4.0*				Hard gray silty CLAY, trace sand and gravel, moist (CL)
11	SS		46	18.6	3.75*				
12	SS		29						
							24.8	701.0	
13	SS		69						Very dense brownish-gray SILT, little sand, little clay, saturated (ML)
14	SS		55	9.4			27.3	698.5	
15	SS		95	10.4	3.75*		29.5	696.3	Very tough to hard gray very silty CLAY, little sand and gravel, moist (CL-ML)
16	SS		45						Dense to very dense gray clayey SAND and GRAVEL, moist to saturated (SC)
17	SS		90						
18	SS		50	12.6					
							36.5	689.3	
19	SS		64	17.3	3.5*				Very tough to hard gray silty CLAY, trace sand and gravel, moist (CL)
20	SS		52	16.6	4.5*				

PROJECT BLACKWELL FOREST PRESERVE: DU PAGE COUNTY, ILLINOIS

CLIENT FOREST PRESERVE DISTRIAT OF DU PAGE CO., P. O. BOX 2339, GLEN ELLYN, IL.

BORING G-134 DATE STARTED 4-11-85 DATE COMPLETED 4-17-85 JOB 21,288

ELEVATIONS

GROUND SURFACE 725.8

END OF BORING 654.8

LOCATION: 661.3 N
310.1 E

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING: -24.96 Feet

Distance Below Surface in Feet	LENGTH RECOVERY	SAMPLE NO.	TYPE	N	WC	Q_u	% DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
40		20	SS	52	16.6	4.5*				Very tough to hard gray silty CLAY, trace sand and gravel, moist (CL)
		21 A	SS	50	19.5	3.25*		41.5	684.3	
		B			-	-				
		22	SS	50						Very dense gray fine to coarse SAND and GRAVEL, saturated (SW-GW)
45		23	SS	80	10.1			44.5	681.3	
		24	SS	83	9.8					
		25	SS	89	11.7	4.5+*				Very tough to hard gray silty CLAY, little sand and gravel moist (CL)
50		26	SS	94	10.6	4.5*				
		27	SS	69	12.0	3.75*				
55		28	SS	78	14.5	2.75*				
		29	SS	53	21.3			56.8	669.0	Very dense brownish-gray SILT, little sand, saturated (ML)
60		30	SS	78						
		31	SS	73				60.8	665.0	Very dense brownish-gray fine t medium SAND, little silt, saturated (SM)
		32	SS	54	12.5	4.5*		63.0	662.8	
65		33 A	SS	50/4"	-	-				Hard gray silty CLAY, trace sand and gravel, moist (CL)
		B			11.2	3.0*		65.0	660.8	
		34	SS	50						Very dense gray clayey SILT, little sand, moist to saturatec (ML)
		35	SS	56	12.4					
70								71.0	654.8	
75										BEDROCK: Gray DOLOMITE
80										

*-Approximate unconfined compress strength based on measurements a calibrated pocket penetrometer

TESTING SERVICE CORPORATION

DRILL RIG NO. 91

BORING LOG CONTINUED

PROJECT BLACKWELL FOREST PRESERVE: DU PAGE COUNTY, ILLINOIS

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE CO., P. O. BOX 2339, GLEN ELLYN, IL.

BORING G-134 DATE STARTED 4-11-85 DATE COMPLETED 4-17-85 JOB 21,288

ELEVATIONS

GROUND SURFACE 725.8

END OF BORING 654.8

LOCATION: 661.3 N
310.1 E

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -24.96 Feet

SHEET 3 OF 3

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Q_u	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
80										
85										
90										
95										BEDROCK: Gray DOLOMITE
100										
105										
110										End of Boring at -108.5 Feet
115										DRILLING AND MONITORING WELL INSTALLATION NOTES FOR G-134D:
120										Original pilot hole drilled and sampled by rotary method and reamed with an 8" rotary bit and Revert to a depth of 73.5'. 4" PVC solid riser pipe was installed to 73.5'. Cement grout with bentonite was pumped through drill rod lowered to the bottom of the hole. The entire annular space plus inside of bottom of PVC was filled with grout. After allowing several days for the grout to set, the hole was extended using a 3 3/4" bit and Revert. The open hole was flushed with clean water. A steel protector pipe was installed and concreted over the well at the surface. 1). Bottom of cased hole: 73.5' 2). Bottom of open hole: 103.5'

PROJECT BLACKWELL FOREST PRESERVE: DU PAGE COUNTY, ILLINOIS

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE CO., P. O. BOX 2339, GLEN ELLYN, IL

BORING G-135 DATE STARTED 4-11-85 DATE COMPLETED 4-17-85** JOB 21,288

** Date of well completion

ELEVATIONS

GROUND SURFACE 719.0

END OF BORING 637.0

LOCATIONS: 878.6 N, 1552.3 W

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -13.0 Feet

SHEET 1 OF 3

Distance Below Surface in Feet	Length Recovery	Sample No.	Type	N	WC	Q_u	Dry	Depth	Elev.	Soil Descriptions
0								1.0	718.0	FILL - Dark brown silty CLAY, some sand & gravel (CL)
		1a								
		1b	SS	29						Firm grayish-brown fine to coarse SAND and small to medium GRAVEL, moist to wet at 13.0' (SW/GW); sandy silt layers from 13.5' to 14.5'; 3" seam of brown silty clay at 14.7'
		2a								
5		2b	SS	16						
		3a								
		3b	SS	17						
		4a								
		4b	SS	17						
10		5a								
		5b	SS	18						
		6a								
		6b	SS	17						
		7a								
		7b	SS	17				15.0	704.0	
15		8a			15.3	3.00	*			Very tough to hard gray silty CLAY, trace sand and gravel, moist (CL)
		8b	SS	13	15.6	3.75	*			
		9a			18.8	4.5+	*			
		9b	SS	22	18.3	4.5+	*			
		10a			17.7	2.75	*			
20		10b	SS	15	13.4	2.25		20.0	699.0	Layers of very tough brownish-gra very silty CLAY (CL); very tough hard gray silty CLAY (CL) and fi brownish-gray clayey SILT (ML
		11a			11.7		*			
		11b	SS	24	15.6	4.5+		23.0	...0	trace sand and gravel, moist
		12a			18.8	4.5+	*			
		12b	SS	29	18.2	4.5+	*			Hard to very tough gray silty CLAY, trace sand and gravel, moist (CL)
25		13a			19.1	4.5+	*			
		13b	SS	30	17.8	4.5+				
		14a			19.1	3.00	*	28.0	691.0	
		14b	SS	77	13.8					Layers of very dense gray clayey SILT (ML) and hard gray very silt CLAY (CL); trace sand and gravel, moist; 4" seam of sandy silt @ 28
		15a			10.2		*			
30		15b	SS	63	13.3	4.5+				
		16	SS	100/11	10.9					
								34.3	684.1	
35		17	SS	63						Very dense gray fine to coarse SAND and small GRAVEL, little silt, saturated (SP)
		18	SS	58				37.3	681.7	
		19	SS	92						Very dense gray sandy SILT, some gravel, occasional cobbles or boulders, trace clay, moist (ML)
40										

TESTING SERVICE CORPORATION

DRILL RIG NO. 91

PROJECT BLACKWELL FOREST PRESERVE: DU PAGE COUNTY, ILLINOIS

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE CO., P. O. BOX 2339, GLEN ELLYN, IL.

BORING G-135 DATE STARTED 4-11-85 DATE COMPLETED 4-17-85** JOB 21,288

** Date of well completion

ELEVATIONS

GROUND SURFACE 719.0

END OF BORING 637.0

LOCATIONS: 878.6 N
1552.3 W

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING: -13.0 Feet

SAMPLE NO.	TYPE	LENGTH RECOVERY	N	WC	Q_u	% DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
20	SS		57	8.6					Very dense gray sandy SILT, some gravel, occasional cobbles or boulders, some sand, moist (ML)
21	SS		44	9.6					
22	SS		78/11	10.0					
23	SS		100/10"	11.3			47.8	671.7	
									BOULDER
							48.5	670.5	
24	SS		50/5"						Very dense brownish-gray very fine sandy SILT, saturated (ML)
25	SS		100/11"						
26	SS		65/6"						
27	SS		100/5 1/2"				56.0	663.0	
28	SS		100/4"						Very dense gray sandy SILT, some gravel, moist (ML)
29	SS		100/3"				59.5	659.5	
									BOULDER
							66.5	652.5	
									Very dense gray sandy SILT, some gravel, moist (ML)
							69.5	649.5	
									BEDROCK: Gray DOLOMITE

Distance Below Surface in Feet

40 45 50 55 60 65 70 75 80

PROJECT BLACKWELL FOREST PRESERVE: DU PAGE COUNTY, ILLINOIS

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE CO., P. O. BOX 2339, GLEN ELLYN, IL.

BORING G-135 DATE STARTED 4-11-85 DATE COMPLETED 4-17-85** JOB 21.288

** Date of well completion

ELEVATIONS

GROUND SURFACE 719.0

END OF BORING 637.0

LOCATIONS: 878.6 N
1552.3 W

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -13.0 Feet

SHEET 3 OF 3

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Q_u	%DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
80										BEDROCK: Gray DOLOMITE
										End of Boring at -82.0 Feet
85										DRILLING AND MONITORING WELL INSTALLATION NOTES:
										One Well Installed in Bedrock - G-135:
90										Due to the nearness of G-135 to G-119, the boring log for G-119 was utilized for the first 31.0 feet of this boring log. Sampling at this location resumed at a depth of 32 feet. The boring was made using a 3 3/4" rotary bit and "Revert" drilling mud. The pilot hole was reamed using an 8" rotary bit and "Revert" to a depth of 72.0 feet. 4" PVC riser pipe was installed in the bore hole. Cement grout with bentonite was pumped through the drill rod which was lowered to the bottom of the bore hole. The entire annular space, plus the inside lower portion of the PVC was filled with grout. After allowing the grout to set for several days, the hole was advanced deeper into rock with a d 3/4" rotary bit and Revert to a depth of 82.0 feet. The open hole (in rock) and the PVC well casing were flushed with clean water. A steel protector casing was concreted into place over the well.
95										
100										
105										
110										
115										
120										

*-Approximate unconfined compressio strength based on measurements w a calibrated pocket penetrometer.

PROJECT BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE COUNTY, GLEN ELLYN, ILLINOIS

BORING G-137 DATE STARTED 8-7-86 DATE COMPLETED 8-7-86 JOB 23,108

S: 1723.6

W: 1010.2

ELEVATIONS

GROUND SURFACE 699.7

END OF BORING 645.2

WATER TABLE

AT END OF BORING -14.5 Feet

24 HOURS

WHILE DRILLING - 9.5 Feet

SHEET 1 OF 2

DISTANCE BELOW SURFACE IN FEET

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Q_u	DRY γ	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.3	699.4	Black clayey TOPSOIL, moist (OL)
1A/B	SS		29	12.4 13.1					Dark brown very sandy gravelly CLAY, little organics, moist, disturbed (CL)
2	SS		18	17.3	4.5*				
3A/B	SS		15	15.5 20.3	-- 3.5*		4.5	695.2	
							6.0	693.7	Very tough dark brown silty CLAY, some sand, trace gravel, moist (CL)
4	SS		46						
5	SS		24						Firm to dense brown fine to coarse SAND and small to large GRAVEL, little silt, wet at 9.5' (SW)
6	SS		34						
7	SS		36						
8	SS		49						
9	SS		21						
10	SS		34						
11	SS		55				20.0	673.7	
12	SS		95						Dense to very dense gray GRAVEL and SAND, wet (GW)
13	SS		61						
14	SS		62						
15	SS		34						
16	SS		33						
17A/B	SS		11	-- 20.1	-- 2.0*		33.5 34.0	666.2 665.7	Very tough gray silty CLAY, little sand, trace gravel, moist (CL)
18	SS		78						Very dense gray GRAVEL and SAND, (GW)
19A/B	SS		32	13.6 11.1	4.5+* --		36.5	663.2	Hard gray silty CLAY, little to s sand, trace gravel, moist (CL)
							38.0	661.7	
20	SS		155/9"						Very dense gray clayey SAND and GRAVEL, wet (GC/SC)
							39.5	660.2	

TESTING SERVICE CORPORATION

BORING LOG CONTINUED

PROJECT BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE COUNTY, GLEN ELLYN, ILLINOIS

BORING C-137 DATE STARTED 8-7-86 DATE COMPLETED 8-7-86 JOB 23,108

S: 1723.6
W: 1010.2

ELEVATIONS

GROUND SURFACE 699.7

END OF BORING 645.2

WATER TABLE

AT END OF BORING -14.5 Feet

24 HOURS

WHILE DRILLING - 9.5 Feet

SHEET 2 OF 2

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	q_u	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
21	SS		95						Very dense yellow-gray fine to coarse SAND and small to large GRAVEL, trace silt and clay, wet (GW)
22	SS		55						
23	SS		68/10"				45.5	654.2	
24	CORE								BEDROCK: Light gray to brown DOLOMITE, micritic, occasional silt partings, trace stylolite moderate to high porosity fractured from 47.5'- 48.5' vertical fracture starting at 53.0'

End of Boring at 54.5 Feet

* Approximate unconfined compression strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

40 45 50 55 60 65 70 75 80

MONITORING WELL INSTALLATION NOTES

1).	4" Schedule 40 PVC #10 slot screen:	43.5 - 53.5'
2).	4" Schedule 40 PVC riser	+2.0 - 43.5'
3).	"Best" #490 sand pack:	42.5 - 54.5'
4).	Bentonite Pellets:	40.0 - 42.5'
5).	Volclay Grout:	2.5 - 42.5'
6).	6" Protector casing concreted in place over well	

TESTING SERVICE CORPORATION

PROJECT BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE COUNTY, GLEN ELLYN, ILLINOIS

BORING C-138 DATE STARTED 8-13-86 DATE COMPLETED 8-14-86 JOB 23,108

S: 254.5
W: 2249.2

ELEVATIONS

GROUND SURFACE 706.6

END OF BORING 650.1

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -16.0 Feet

DISTANCE BELOW SURFACE IN FEET

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Q_u	%DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
1	SS		13	19.7					Dark brown silty TOPSOIL, little sand, some roots, damp (OL)
							2.0	704.6	
2	SS		17	21.6					Firm brown silty SAND and GRAVEL, moist clay binder (GC)
							3.3	703.3	
3A/B	SS		9						Loose to firm brown fine to medium SAND, little clay binder, damp (SP)
4	SS		18						
							8.0	698.6	
5	SS		35						Dense brown fine to medium grained SAND with GRAVEL, damp; 0.2' brown sand clay seam at 10.3', damp (SP)
6	SS		47						
7	SS		35						
8	SS		37						
							16.0	690.6	
9	SS		34						Firm to very dense brown silty SAND and GRAVEL, wet (GW/SW)
10	SS		24						
11	SS		15						
12	SS		13						
13	SS		17						
14	SS		18						
15A/B	SS		63						
							29.5	677.1	
16	SS		23						Firm gray sandy GRAVEL, wet (GW)
							32.0	674.6	
17	SS		63	8.8					Dense gray clayey SILT, some sand, trace gravel, damp to moist, very moist from 44.0 - 46.0' (ML)
18	SS		33	8.8					
19	SS		37	9.1					
20	SS		41	10.2					

BORING LOG CONTINUED

PROJECT BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESRVE DISTRICT OF DU PAGE COUNTY, GLEN ELLYN, ILLINOIS

BORING C-138 DATE STARTED 8-13-86 DATE COMPLETED 8-14-86 JOB 23,108

S: 254.5
W: 2249.2

ELEVATIONS

GROUND SURFACE 706.6

END OF BORING 650.1

WATER TABLE

AT END OF BORING

24 HOURS

WHILE DRILLING -16.0 Feet

SHEET 2 OF 2

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Q_u	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
21	SS		33	10.1					Dense gray clayey SILT, some sand, trace gravel, damp to moist, very moist from 44.0 - 46.0' (ML)
22	SS		48	12.0					
23	SS		16	11.5			46.0	660.6	
24	CORE								BEDROCK: Fractured to 48.0' light gra to light brown DOLOMITE, micritic, massive, occa[illegible] silt partings, high poro[illegible] occasional fractures, trace illite at 56.5'
									End of Boring at 56.5 Feet

DISTANCE BELOW SURFACE IN FEET

40 45 50 55 60 65 70 75 80

* Approximate unconfined compression strength based on measurements with a calibrated pocket penetrometer.

MONITORING WELL INSTALLATION NOTES

1).	4" Schedule 40 PVC #10 screen:	44.0 - 54.0'
2).	4" Schedule 40 PVC riser:	+2.0 - 44.0'
3).	"Best" #490 sand pack:	43.5 - 56.5'
4).	Bentonite Pellets:	41.0 - 43.5'
5).	Volclay Grout:	2.5 - 41.0'
6).	6" protector casing concreted in place over well	

PROJECT BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESRVE DISTRICT OF DU PAGE COUNTY, GLEN ELLYN, ILLINOIS

BORING C-139 DATE STARTED 8-18-86 DATE COMPLETED 8-19-86 JOB 23.1

N: 540.3
W: 2512.8

ELEVATIONS

GROUND SURFACE 700.1

END OF BORING 643.6

WATER TABLE

AT END OF BORING -14.0 Feet

24 HOURS

WHILE DRILLING - 7.5 Feet

SHEET 1 OF 2

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Q_u	γDRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
1 A/B	SS		25	14.9 --			1.4	698.7	Black clayey TOPSOIL, moist (OL)
2	SS		54						Firm to very dense light brown GRAVEL and SAND, little silt, damp (GM)
3	SS		28						
4 A/B	SS		48				7.5	692.6	
5	SS		58						Firm to very dense gray SAND and GRAVEL, wet (GM/SW)
6	SS		48						NOTE: 3" Black sand seam at 9.3', strange odor
7	SS		96						
8	SS		21						
9 A/B	SS		30	-- 17.8	-- 4.5+*		17.0	683.1	
10 A/B	SS		30	18.0 --	2.0* --		19.5	680.6	Very tough to hard gray silty CLAY, little sand, silt partings, moist
							20.0	680.1	Firm brownish gray fine sandy SILT, trace clay, moist (ML)
11	SS		24				22.0	678.1	Firm gray fine to medium SAND, wet
12	SS		66/10"	10.4	4.5+*		24.0	676.1	Hard gray silty CLAY, little sand, gravel, moist (CL)
13	SS		74						Very dense (hard) gray very clayey SILTS, very silty CLAY, some sand, occasional silt and sand seams, damp to moist, reddish hue to 26.0' (CL/ML)
14	SS		58	14.9	4.5+*		28.0	672.1	
15	SS		45	12.2					Dense brownish gray clayey SILT, trace sand and gravel, moist (ML)
16 A/B	SS		37	17.3 12.1	-- 4.5+*		31.0	669.1	
17	SS		40	11.9	4.5+*				Tough to hard gray silty CLAY, little sand, some gravel, moist (CL)
18	SS		29	12.8	3.0*				
19	SS		33	18.5	1.0*				
20 A/B	SS		59	16.5 --	2.25* --		39.2	660.9	Very dense brownish gray sandy SILT, trace clay, damp (ML)

DISTANCE BELOW SURFACE IN FEET

TESTING SERVICE CORPORATION

BORING LOG CONTINUED

PROJECT BLACKWELL FOREST PRESERVE

CLIENT FOREST PRESERVE DISTRICT OF DU PAGE COUNTY, GLEN ELLYN, ILLINOIS

BORING G-139 DATE STARTED 8-18-86 DATE COMPLETED 3-19-86 JOB 23.108

N: 540.3
W: 2512.8

ELEVATIONS

GROUND SURFACE 700. 1

END OF BORING 643.6

WATER TABLE

AT END OF BORING -14.0 Feet

24 HOURS

WHILE DRILLING - 7.5 Feet

SHEET 2 OF 2

SAMPLE NO.	SAMPLE TYPE	N	WC	Q_u	%DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
21	SS	47	11.0			42.0	658.1	Dense gray clayey SILT, trace sand and gravel, moist (ML)
22A/B	SS	4	15.9 / --	1.0* / --		43.7	656.4	Tough gray silty CLAY, little sand, trace gravel, moist (CL)
23	SS	82/10"				46.0	654.1	Very dense gray silty very fine SAND, wet (SM)
24	SS	50/3"	9.6			47.5	652.6	Very dense clayey SILT and SAND, some gravel, damp to moist (ML/SC)
25	CORE							BEDROCK: Light gray DOLOMITE, micr[illegible] occasional silt partings, tra stylolites, massive, moderate porosity, fractured from 51.0' - 51.5'; fracture has secondary recrystallization

DISTANCE BELOW SURFACE IN FEET

40 45 50 55 60 65 70 75 80

End of Boring at -56.5 Feet

* Approximate unconfined compression strength based on measurements wit a calibrated pocket penetrometer.

MONITORING WELL INSTALLATION NOTES

1).	4" Schedule 40 PVC #10 screen:	45.5 - 55.5'
2).	4" Schedule 40 PVC riser:	+2.5 - 45.5'
3).	"Best" #490 sand pack:	43.5 - 56.5'
4).	Bentone pellets:	See Report
5).	Volclay Grout:	2.5 - 43.5'
6).	6" Protector casing concreted in place over well	

KEY TO BORING LOGS

Sample Type

Unsampled interval

Auger cuttings sample

Drilled by hollow stem augers; not sampled; logged by cuttings

Hand sample from surface

4" outside diameter core barrel sampler

Drilled by rotary wash bore; not sampled; logged by cuttings

5' continuous sampler

3" outside diameter split spoon sampler

3" shelby tube

2" outside diameter split spoon sampler

Lithologic Description

Unknown lithology

Lean clay

Silty clay or clayey silt

Sandy clay

Concrete

Construction debris-laden fill material

Gravel

Clayey gravel

Silty gravel

Sandy gravel

Limestone or dolomitic limestone

Silt

Gravelly silt

Silty sand

Peat

Sand

Gravelly sand

Sandy silt

Topsoil

Borehole Material Graphics

Concrete around flush-mounted protective casing

Concrete surface seal around well casing

Bentonite slurry or cement-bentonite grout around well casing

Bentonite pellet [illegible]round well casing

Bentonite pellet seal around well screen

Sand backfill around well casing

Sand filter pack around well screen

Sand backfill or natural soil collapse in borehole

Concrete surface seal over borehole

Bentonite slurry or bentonite-cement grout backfill in borehole

Cuttings backfill in borehole

Bentonite seal in borehole

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LOG OF TEST BORING

General Notes

Descriptive Soil Classification

GRAIN SIZE TERMINOLOGY

Soil Fraction	Particle Size	U.S. Standard Sieve Size
Boulders	Larger than 12"	Larger than 12"
Cobbles	3" to 12"	3" to 12"
Gravel: Coarse	¾" to 3"	¾" to 3"
Fine	4.76 mm to ¾"	#4 to ¾"
Sand: Coarse	2.00 mm to 4.76 mm	#10 to #4
Medium	0.42 mm to 2.00 mm	#40 to #10
Fine	0.074 mm to 0.42 mm	#200 to #40
Silt	0.005 mm to 0.074 mm	Smaller than #200
Clay	Smaller than 0.005 mm	Smaller than #200

Plasticity characteristics differentiate between silt and clay.

GENERAL TERMINOLOGY

Physical Characteristics
Color, moisture, grain shape, fineness, etc.

Major Constituents
Clay, silt, sand, gravel

Structure
Laminated, varved, fibrous, stratified, cemented, fissured, etc.

Geologic Origin
Glacial, alluvial, eolian, residual, etc.

RELATIVE DENSITY

Term	"N" Value
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

RELATIVE PROPORTIONS OF COHESIONLESS SOILS

Proportional Term	Defining Range By Percentage of Weight
Trace	0%- 5%
Little	5%-12%
Some	12%-35%
And	35%-50%

CONSISTENCY

Term	q,-tons/sq. ft.
Very Soft	0.0 to 0.25
Soft	0.25 to 0.50
Medium	0.50 to 1.0
Stiff	1.0 to 2.0
Very Stiff	2.0 to 4.0
Hard	Over 4.0

ORGANIC CONTENT BY COMBUSTION METHOD

Soil Description	Loss on Ignition
Non Organic	Less than 4%
Organic Silt/Clay	4-12%
Sedimentary Peat	12-50%
Fibrous and Woody Peat	More than 50%

PLASTICITY

Term	Plastic Index
None to Slight	0-4
Slight	5-7
Medium	8-22
High to Very High	Over 22

The penetration resistance, N, is the summation of the number of blows required to effect two successive 6" penetrations of the 2" split-barrel sampler. The sampler is driven with a 140 lb. weight falling 30" and is seated to a depth of 6" before commencing the standard penetration test.

Symbols

DRILLING AND SAMPLING

CS—Continuous Sampling
RC—Rock Coring: Size AW, BW, NW, 2" W
RQD—Rock Quality Designator
RB—Rock Bit
FT—Fish Tail
DC—Drove Casing
C—Casing: Size 2½", NW, 4", HW
CW—Clear Water
DM—Drilling Mud
HSA—Hollow Stem Auger
FA—Flight Auger
HA—Hand Auger
COA—Clean-Out Auger
SS—2" Diameter Split-Barrel Sample
2ST—2" Diameter Thin-Walled Tube Sample
3ST—3" Diameter Thin-Walled Tube Sample
PT—3" Diameter Piston Tube Sample
AS—Auger Sample
WS—Wash Sample
PTS—Peat Sample
PS—Pitcher Sample
NR—No Recovery
S—Sounding
PMT—Borehole Pressuremeter Test
VS—Vane Shear Test
WPT—Water Pressure Test

LABORATORY TESTS

q_p—Penetrometer Reading, tons/sq. ft.
q_u—Unconfined Strength, tons/sq. ft.
W—Moisture Content, %
LL—Liquid Limit, %
PL—Plastic Limit, %
SL—Shrinkage Limit, %
LI—Loss on Ignition, %
D—Dry Unit Weight, [illegible] sq. ft.
pH—Measure of Soil Alkalinity or Acidity
FS—Free Swell, %

WATER LEVEL MEASUREMENT

▽—Water Level at time shown
NW—No Water Encountered
WD—While Drilling
BCR—Before Casing Removal
ACR—After Casing Removal
CW—Caved and Wet
CM—Caved and Moist

Note: Water level measurements shown on the boring logs represent conditions at the time indicated and may not reflect static levels, especially in cohesive soils.

Description of Borings and Wells

No. = Sample number within the boring

Rec. = Amount of sample recovery

Moist = Visual estimate of the amount of moisture in the sample.

Type = Sampler type and sample interval

N Value = The penetration resistance, N, is the summation of the number of blows required to effect two successive 6" penetrations of the 2" split-spoon sampler. The sampler is driven with a 140 lb. weight falling 30" and is seated to a depth of 6" before commencing the standard penetration test.

Depth = Depth below ground surface

Visual Classification = Lithology symbol of stratigraphy; Description of stratigraphy; Borehole material graphics

qu(qa) = Unconfined compressive strength of the sample

PID = Photoionization detector reading

Description of Soil Samples

General Terminology

Relative Density (of noncohesive soils) or consistency (of cohesive soils)
Color
Grain Size (of noncohesive soils)
Major soil constituent
Minor proportions
Other characteristics or features
Unified Soil Classification System (USCS) Symbol

Descriptive Terms

NM = Not measured
ND = Not detected
M = Moist
F = Frozen
D = Dry
W = Wet
– = Measurement not possible

Relative Density

Term	"N" Value
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Consistency

Term	qa.-tons/sq
Very Soft	0.0 to 0.25
Soft	0.25 to 0.50
Medium	0.50 to 1.0
Stiff	1.0 to 2.0
Very Stiff	2.0 to 4.0
Hard	Over 40

Grain Size Terminology

Soil Fraction		Particle Size	U.S. Standard Sieve Size
Boulders		Larger than 12"	Larger than 12"
Cobbles		3" to 12"	3" to 12"
Gravel:	Coarse	3/4" to 3"	3/4" to 3"
	Fine	4.76 mm to 3/4"	#4 to 3/4"
Sand:	Coarse	2.00 mm to 4.76 mm	#10 to #4
	Medium	0.42 mm to 2.00 mm	#40 to #10
	Fine	0.074 mm to 0.42 mm	#200 to #40
Silt		0.005 mm to 0.074 mm	Smaller than #200
Clay		Smaller than 0.005 mm	Smaller than #200

Plasticity characteristics differentiate between silt and clay.

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UNIFIED SOIL CLASSIFICATION SYSTEM

COARSE-GRAINED SOILS

(More than half of material is larger than No. 200 seive size.)

GRAVELS More than half of coarse fraction larger than No. 4 sieve size

Clean Gravels (Little or no fines)

GW	Well-graded gravels, gravel-sand mixtures, little or no fines
GP	Poorly graded gravels, gravel-sand mixtures, little or no fines

Gravels with Fines (Appreciable amount of fines)

GM^{d}_{u}	Silty gravels, gravel-sand-silt mixtures
GC	Clayey gravels, gravel-sand-clay mixtures

SANDS More than half of coarse fraction smaller than No. 4 sieve size

Clean Sands (Little or no fines)

SW	Well-graded sands, gravelly sands, little or no fines
SP	Poorly graded sands, gravelly sands, little or no fines

Sands with Fines (Appreciable amount of fines)

SM^{d}_{u}	Silty sands, sand-silt mixtures
SC	Clayey sands, sand-clay mixtures

FINE-GRAINED SOILS

(More than half of material is smaller than No. 200 sieve.)

SILTS AND CLAYS Liquid limit less than 50%

ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
OL	Organic silts and organic silty clays of low plasticity

SILTS AND CLAYS Liquid limit greater than 50%

MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
CH	Inorganic clays of high plasticity, fat clays
OH	Organic clays of medium to high plasticity, organic silts

HIGHLY ORGANIC SOILS

PT	Peat and other highly organic soils

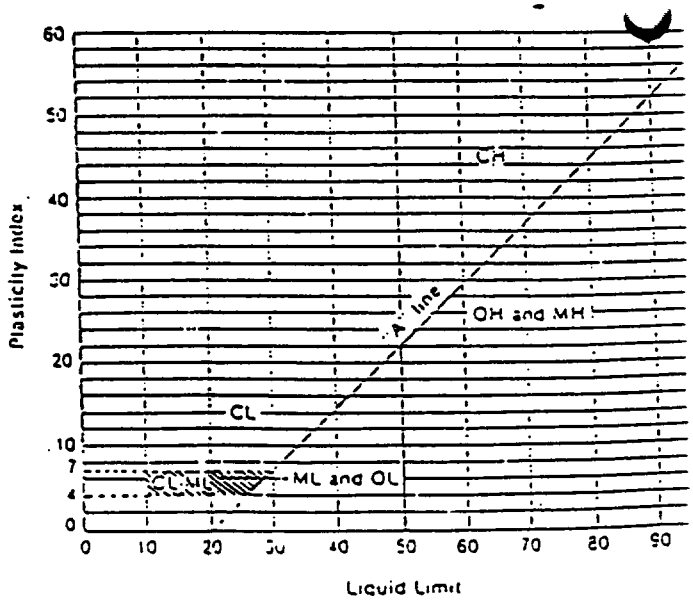
LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for SW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in hatched zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 per cent	GW, GP, SW, SP
More than 12 per cent	GM, GC, SM, SC
5 to 12 per cent	Borderline cases requiring dual symbols

PLASTICITY CHART



For classification of fine-grained soils and fine fraction of coarse grained soils.

Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols.

Equation of A-line: PI = 0.73 (LL - 20)

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LOG OF TEST BORING

Project Blackwell Landfill
RI/FS
Location Warrenville, Illinois

Boring No. G-140D
Surface Elevation 702.9
Job No. 6072100
Sheet 1 of 2

2100 CORPORATE DRIVE · ADDISON, ILLINOIS 60101 · TEL. (708) 691-5000

SAMPLE Number	TYPE	Rec. (ft.)	Moisture	N Value	Depth (ft.)	PROFILE	VISUAL CLASSIFICATION and Remarks	BACKFILL BOREHOLE	SOIL PROPERTIES qu (qa) (tsf)	PID (ppm)
							Black Silty TOPSOIL			
							Medium Stiff, Dark Brown to Black, Mixed Silty Clay and Silty Fine Sand, Some Fine to Coarse Gravel (FILL)			
1		1.0	M	11						1.5
					5		Medium Dense, Light Brown Fine to Medium Sandy SILT, Some Fine to Coarse Gravel (ML) (TILL)			
2		1.2	M	12						1.5
3		1.2	M	11						6.0
					10					
4		1.2	W	17			Medium Dense, Brown, Silty Fine to Medium SAND, Little Fine to Coarse Gravel (SM) (TILL). Scattered 1" Brown Fine to Coarse Sand Seams			2.5
5		1.5	W	4			Loose, Gray Fine Sandy SILT (ML) Thin, Horizontal Laminae (1/4" to 1/2") of Silt, Fine Sand and Silty Fine Sand (ML/SP/SM) (Medial Outwash)			0.1
6		1.5	W	2	15					0.2
7		0.3	M	17			Medium Dense, Gray Fine to Medium SAND (SP)			0.5
					20		Very Dense, Gray-Brown Fine to Coarse Gravelly SAND, Little Silt (SP-SM)			
8		1.5	M	41						0.5
9		1.5	W	26						0.2
					25					
10		1.3	W	21						0.2
11		0.5	W	15						0.6
					30					
12		0.7	W	26						0.6
13		0.8	W	19						0.6

WATER LEVEL OBSERVATIONS

While Drilling ▽ 13.5' Upon Completion of Drilling ▼
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

GENERAL NOTES

Begin 6/10/91 End 6/10/91 Drill
Driller Mathes Chief JB Rig CME
Logger GFP Editor JAW 75
Drill Method 4.25" HSA 0- 41' Wash
Rotary 41-59'

WARZYN

LOG OF TEST BORING

Project Blackwell Landfill
RI/FS
Location Warrenville, Illinois

Boring No. G-140D
Surface Elevation 702.9
Job No. 6072100
Sheet 2 of 2

2100 CORPORATE DRIVE · ADDISON, ILLINOIS 60101 · · TEL. (708) 691-5000

SAMPLE Number	TYPE	Rec. (ft.)	Moisture	N Value	Depth (ft.)	PROFILE	VISUAL CLASSIFICATION and Remarks	BOREHOLE BACKFILL	SOIL PROPERTIES qu (qa) (tsf)	PID (ppm)
14		1.0	W	24	35					0.5
15		0.8	W	51						0.2
16		0.7	W	25	40		Dense, Gray-Brown Fine to Coarse Sandy SILT, Some Fine to Coarse Gravel (ML) (TILL)			0.2
17		0.3	W	50						0.5
					45					
					50					
					55		Light Brown to Light Gray, Hard DOLOMITE; Small Pinhole-Sized Vugs			
							End of Boring at 59.0 Feet			
					60					
					65					
					70					

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LOG OF TEST BORING

Project Blackwell Landfill RI/FS
Location Warrenville, Illinois

Boring No. G-141D
Surface Elevation 705.6
Job No. 6072100
Sheet 1 of 2

2100 CORPORATE DRIVE · ADDISON, ILLINOIS 60101 · TEL. (708) 691-5000

SAMPLE Number	TYPE	Rec. (ft.)	Moisture	N Value	Depth (ft.)	PROFILE	VISUAL CLASSIFICATION and Remarks	BOREHOLE	BACKFILL	SOIL PROPERTIES qu (qa) (tsf)	PID (ppm)
							Black Silty TOPSOIL				
1		0.8	M	50/5			Very Dense, Brown Silty Fine to Coarse SAND, Some Fine to Coarse Gravel (FILL)				
											1.8
2		0.7	M	13	5		Soft, Brown, Varigated Silty CLAY Little Fine to Coarse Sand (FILL)				
							Medium Dense, Brown, Fine to Coarse Gravelly SAND (FILL)				1.8
3		1.7	M	19			Black, Old TOPSOIL				
											10.0
4		2.0	M	16	10		Medium Dense, Brown, Fine to Coarse SAND, Some Fine to Coarse Gravel, Little Silt (SP-SM)				
											8.0
5		1.7	M/W	12			Medium Dense, Brown Fine to Medium SAND, Trace Silt (SP)				
											10.0
6		1.2	W	10	15		Medium Dense, Brown, Silty Fine to Medium SAND (SM), (Leachate Odor)				
											0.5
7		1.7	W	35			Medium Dense, Brown Fine to Coarse SAND, Some Fine to Coarse Gravel, Little Silt (SP-SM) (Leachate Odor)				
											0.8
8		2.0	W	71	20		Loose, Gray Fine Sandy SILT, Little Clay (ML)				
											0.0
9		1.0	M	84			Very Dense Gray Fine to Coarse Sandy GRAVEL, Some Silt Scattered Cobbles and Boulders (GM)				
											0.5
10		1.3	W	65	25						
											0.5
11		0.8	W	26							
											0.8
12		0.7	W	9	30		Medium Stiff, Gray Fine to Medium Sandy SILT, Little Fine to Coarse Gravel (ML) QP=1.5 TSF (TILL)				
											0.0
13		1.7	W	15			Medium Dense, Gray Fine to Coarse				

WATER LEVEL OBSERVATIONS

While Drilling ▽ 14.0' Upon Completion of Drilling ▽
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

GENERAL NOTES

Begin 6/13/91 End 6/13/91 Drill
Driller Mathes Chief JB Rig CME
Logger GFP Editor JAW 75
Drill Method 4.25"HSA 0- 44.5' Wash
Rotary 44.5-66.5'

WARZYN

LOG OF TEST BORING

Project Blackwell Landfill RI/FS

Location Warrenville, Illinois

Boring No. G-141D

Surface Elevation 705.6

Job No. 6072100

Sheet 2 of 2

2100 CORPORATE DRIVE · ADDISON, ILLINOIS 60101 · · TEL. (708) 691-5000

SAMPLE Number	Type	Rec. (ft.)	Moisture	N Value	Depth (ft.)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	PID (ppm)
					35	SAND, Little Fine to Coarse Gravel (SP)		0.0
14		0.7	W	16				0.0
15		1.0	W	14		Medium Stiff, Gray Fine to Medium Sandy SILT, Little Fine to Coarse Gravel (ML) (TILL)		
16		1.9	M	24				0.5
17		2.0	M	48				0.4
18		1.5	M	25	40			0.1
						Dense, White, Silty Fine to Coarse GRAVEL (GM) (Weathered Dolomite Bedrock)		0.2
19		1.3	W	30				0.0
20		0.3	W	50/4	45			0.4
					50			
					55	Hard, Light Gray to Light Brown, Slightly Vuggy, Mostly Solid DOLOMITE, Vugs Range From Pinhole to 1/20" Diameter; No Discernable Fossils; RQD-5.2/5.6. Most Fractures are Horizontal; Vertical Fracture at 48.5' to 49.1'		
					60			
					65	End of Boring at 66.5 Feet		
					70			

PROFILE

BOREHOLE

BACKFILL

WARZYN

LOG OF TEST BORING

Project Blackwell Landfill
Remedial Investigation
Location Warrenville, Illinois

Boring No. P3
Surface Elevation 704.2
Job No. 60721.00
Sheet 1 of 1

2100 CORPORATE DRIVE - ADDISON, ILLINOIS 60101 - TEL. (708) 691-5000

SAMPLE Number	TYPE	Rec. (ft.)	Moisture	N Value	Depth (ft.)	PROFILE	VISUAL CLASSIFICATION and Remarks	BOREHOLE BACKFILL	SOIL PROPERTIES qu (qa) (tsf)	PID (ppm)
							Black to Brown Organic SILT (OL)			
							Dark Brown to Brown Silty Fine SAND and Fine to Coarse GRAVEL, Dry and Loose (SP-GP)			
1		1.0	D	11	5					
2		1.3	W	13	10		Decreasing Silt with Depth, Trace Dolomite Cobbles and Rust Color.			
					15		End of Boring at 15 Feet Installed Piezometer P3 to 15 Feet			
					20					
					25					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 10.0 Upon Completion of Drilling ▼ 9.7
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

GENERAL NOTES

Begin 6/4/91 End 6/4/91 Drill
Driller Mathes Chief JTB Rig CME75
Logger TJM Editor JAW
Drill Method 4-1/4" HSA

WARZYN

LOG OF TEST BORING

Project: Blackwell Landfill
Remedial Investigation
Location: Warrenville, Illinois

Boring No. P2
Surface Elevation 696.5
Job No. 60721.00
Sheet 1 of 1

2100 CORPORATE DRIVE - ADDISON, ILLINOIS 60101 - TEL. (708) 691-5000

SAMPLE Number	TYPE	Rec. (ft.)	Moisture	N Value	Depth (ft.)	PROFILE	VISUAL CLASSIFICATION and Remarks	BOREHOLE BACKFILL	SOIL PROPERTIES qu (qa) (tsf)	PID (ppm)
							Straight Drill 5 Feet, then sample every 5 foot interval. Black to Brown Organic Clayey SILT, Trace Fine Sand (OL)			
1		1.1	M	14	5		Brown Soft Clayey SILT, Trace Fine Sand. (ML)			
							Brown Fine to Coarse SAND and GRAVEL, Trace Silt and Dolomite Cobbles. (SP)			
2		1.2	W	20	10		Drill to 12.5' for Well Placement			
							End of Boring at 12.5 Feet Install Piezometer P2 to 12.5 Feet			
					15					
					20					
					25					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 8.0 Upon Completion of Drilling ▽ 5.0
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

GENERAL NOTES

Begin 6/3/91 End 6/3/91 Drill
Driller Mathes Chief JTB Rig CME7
Logger TJM Editor JAW
Drill Method 4-1/4" HSA

MONTGOMERY WATSON

2100 Corporate Drive
Addison, IL 60101
TEL. (708) 691-5000

LOG OF TEST BORING
General Notes

EMPIRICAL CORRELATIONS WITH STANDARD PENETRATION RESISTANCE N VALUES *

	N VALUE * (BLOWS/FT)	CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS/SQ FT)
FINE GRAINED SOILS	0 - 2	VERY SOFT	0 - 0.25
	3 - 4	SOFT	0.25 - 0.50
	5 - 8	MEDIUM STIFF	0.50 - 1.00
	9 - 16	STIFF	1.00 - 2.00
	17 - 32	VERY STIFF	2.00 - 4.00
	>32	HARD	>4.00

	N VALUE * (BLOWS/FT)	RELATIVE DENSITY
COARSE GRAINED SOILS	0 - 4	VERY LOOSE
	5 - 10	LOOSE
	11 - 30	MEDIUM DENSE
	31 - 50	DENSE
	>50	VERY DENSE

* ASTM D 1586; NUMBER OF BLOWS OF 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2 IN. O.D., 1 1/2 IN. I.D. SAMPLER ONE FOOT.

GRAIN SIZE TERMINOLOGY

Soil Fraction	Particle Size	U.S. Standard Sieve Size
Boulders	Larger than 12"	Larger than 12"
Cobbles	3" to 12"	3" to 12"
Gravel: Coarse	3/4" to 3"	3/4" to 3"
Fine	4.76 mm to 3/4"	#4 to 3/4"
Sand: Coarse	2.00 mm to 4.76 mm	#10 to #4
Medium	0.42 mm to 2.00 mm	#40 to #10
Fine	0.074 mm to 0.42 mm	#200 to #40
Silt	0.005 mm to 0.074 mm	Smaller than #200
Clay	Smaller than 0.005 mm	Smaller than #200

Plasticity characteristics differentiate between silt and clay.

ORGANIC CONTENT BY COMBUSTION METHOD

Soil Description	Loss on Ignition
Non Organic	Less than 4%
Organic Silt/Clay	4-12%
Sedimentary Peat	12-50%
Fibrous and Woody Peat	More than 50%

RELATIVE PROPORATIONS OF COHESIONLESS SOILS

Proportional Term	Defining Range By Percentage of Weight
Trace	0% - 5%
Little	5% - 12%
Some	12% - 35%
And	35% - 50%

GENERAL TERMINOLOGY

Physical Characteristics - Color, moisture, grain shape, fineness, etc.
Major Constituents - Clay, silt, sand, gravel
Structure - Laminated, varved, fibrous, stratified, cemented, fissured, etc.
Geologic Origin - Glacial, alluvial, eolian, residual, etc.

DESCRIPTION OF BORING LOG HEADINGS

No. = Sample number within the boring.
Rec. = Amount of sample recovery.
Moist = Visual estimate of the amount of moisture in the sample.
Type = Sampler type and sample interval.
N Value = The penetration resistance, N, is the sum of blows required to effect two successive 6" penetrations of the 2" split-spoon sampler per ASTM D1586.
Depth = Depth below ground surface.
Visual Classification = Lithologic symbol of soil or rock type; Description of stratigraphy; Borehole material graphics.
q_a = Penetrometer Reading, tons/sq. ft.
PID = Photoionization detector reading. Values are recorded as benzene equivalent units in ppm above background (0 = background reading).

Other environmental analyses may be reported. Results are provided as a value where quantifiable or as zero or ND when below detection limit.

SYMBOLS

SAMPLE TYPE

- Unsampled interval
- 2" outside diameter split spoon sampler
- 3" outside diameter split spoon sampler
- 3" Shelby tube
- 5' continuous sampler
- Drilled by hollow stem augers; not sampled; logged by cuttings
- Hand sample from surface
- 4" outside diameter core barrel sampler
- Drilled by rotary wash bore; not sampled; logged by cuttings

WELL GRAPHICS

- Concrete surface seal around well casing
- Bentonite slurry or cement-bentonite grout around well casing
- Bentonite pellet seal around well casing
- Fine filter sand backfill around well casing
- Sand backfill around well casing
- Sand filter pack around well screen
- Sand backfill or natural soil collapse in borehole
- Bentonite seal in borehole
- Gravel backfill around well casing
- Gravel backfill around vertical slot gas well
- Gravel backfill around a leachate well
- Gravel backfill around a perforated gas well
- Gravel base material

LABORATORY TESTS

W - Moisture Content, %
LL - Liquid Limit, %
PL - Plastic Limit, %
LI - Loss on Ignition, %
D - Dry Unit Weight, lbs./cu. ft.
pH - Measure of Soil Alkalinity or Acidity

DRILLING AND SAMPLING

RC - Rock Coring (Size)
RQD - Rock Quality Designator
RB - Rotary Boring
DM - Drilling Mud
CW - Clear Water
AR - Air Rotary
DC - Drove Casing (Size)
HSA - Hollow Stem Auger
FA - Flight Auger
HA - Hand Auger

WATER LEVEL MEASUREMENT

▽ - Water level at time shown
NW - No Water Encountered
WD - While Drilling
BCR - Before Casing Removal
ACR - After Casing Removal
AD - After Drilling

NOTE: Water level measurements shown on the boring logs represent conditions at the time indicated and may not reflect static levels.

MONTGOMERY WATSON

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Addison, IL 60101
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UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (More than 50% of material is larger than No. 200 sieve size.)			
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
		GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
	Gravels with Fines (More than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
		SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with Fines (More than 12% fines)	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)			
SILTS AND CLAYS Liquid limit less than 50%		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils

LABORATORY CLASSIFICATION CRITERIA

GW $C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} X D_{60}}$ between 1 and 3

GP Not meeting all gradation requirements for GW

GM Atterberg limits below "A" line or P.I. less than 4

GC Atterberg limits above "A" line with P.I. greater than 7

Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols

SW $C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} X D_{60}}$ between 1 and 3

SP Not meeting all gradation requirements for SW

SM Atterberg limits below "A" line or P.I. less than 4

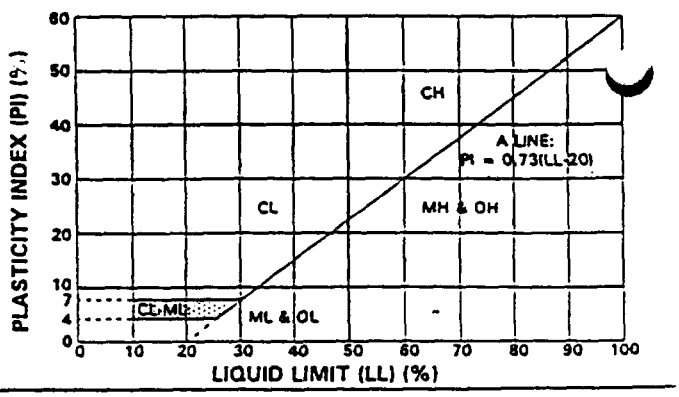
SC Atterberg limits above "A" line with P.I. greater than 7

Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent	GW, GP, SW, SP
More than 12 percent	GM, GC, SM, SC
5 to 12 percent	Borderline cases requiring dual symbols

PLASTICITY CHART



OTHER MATERIAL SYMBOLS

Topsoil	GS	SM/GM	CL-ML	Crystalline Rock	Dolomite
Pavement	GC-GM	SC/GC	Claystone	Sandstone	Siltstone
Fill					
Refuse	GS2	SC-SM	Coal	Limestone	Shale

See log description for USCS classification of the following soils:
SM/GM & SC/GC - Symbols are used to differentiate SM, GM, SC & GC soils.

GS2 - Symbol used when approximately equal percentages of gravel, sand, silt & clay exist.
GS - Symbol used for GP, GW, SP or SW soils with nearly equal sand and gravel.

MONTGOMERY WATSON

LOG OF TEST BORING

Project: Blackwell Forest Preserve

Location: Warrenville, Illinois

Boring No. G142
Job No. 1252008.051602
Sheet 1 of 1
Surface Elevation
Northing:
Easting:

2100 Corporate Drive, Addison, Illinois 60101, TEL. (708) 691-5000

SAMPLE No.	Type	Rec. (in.)	Moisture	N Value	Depth (ft.)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	PID (ppm)	Remarks
1		4	D	16		Brown, Fine SAND and SILT, Roots (TOPSOIL)		0.0	
2		4	D	16	5	Brown, Fine to medium SAND (SP)		0.0	
3		8	D	42		Little Limestone Gravel, Trace Silt at 6.0 ft		0.0	
4		10	D	73				0.0	
5		12	M	55	10	Brown/Gray, Fine to Coarse SAND, Little Gravel, Trace Silt (SP)		0.0	
6		7	M	28				0.0	
7		4	W	31	15	Brown/Gray, Medium to Coarse SAND and GRAVEL (GS)		0.0	
8		8	W	19		Trace Silt at 17.0 ft		0.0	
					20	End of Boring at 21.0 ft			
					25				
					30				

WATER LEVEL OBSERVATIONS

While Drilling ▽ 14.5 ft. Upon Completion of Drilling ▽ ft.
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 10/6/97 End 10/6/97
Driller Rock&SoilChief Rig Acker
Logger AMH Editor
Drill Method Rotary 4 1/4 " ID HSA; 18" SS on 2 1/2' Centers

MONTGOMERY WATSON

LOG OF TEST BORING

Project: Blackwell Forest Preserve

Location: Warrenville, Illinois

Boring No. G143
Job No. 1252008.051602
Sheet 1 of 1
Surface Elevation
Northing:
Easting:

2100 Corporate Drive, Addison, Illinois 60101, TEL. (708) 691-5000

SAMPLE No.	Type	Rec. (in.)	Moisture	N Value	Depth (ft.)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	PID (ppm)	Remarks
					0–10				Boring drilled with no sampling. See boring log P3 for stratigraphy.
1		6	M	26	10	Brown, Fine SAND, Some Silt and Gravel (SP)		0.0	
2		12	W	38		Brown/Gray, Medium to Coarse SAND, Some Gravel (SP)		0.0	
3		6	W	34	15	Brown/Gray, Medium to Coarse SAND and GRAVEL (GS)		0.0	
4		12	W	46				0.0	
5		10	W	27				0.0	
					20	End of Boring at 20.0 ft			

WATER LEVEL OBSERVATIONS

While Drilling ___ ft. Upon Completion of Drilling ___ ft.
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 10/1/97 End 10/1/97
Driller Rock&SoilChief Rig Acker
Logger JMK Editor
Drill Method Rotary 4 1/4 " ID HSA; SS from 10' to EOB

CoalBLAC2 ID: CHICAGO

MONTGOMERY WATSON

LOG OF TEST BORING

Project: Blackwell Forest Preserve

Location: Warrenville, Illinois

Boring No. G144
Job No. 1252008.051602
Sheet 1 of 1
Surface Elevation
Northing:
Easting:

2100 Corporate Drive, Addison, Illinois 60101, TEL. (708) 691-5000

SAMPLE No.	Type	Rec. (in.)	Moisture	N Value	Depth (ft.)	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES qu (qa) (tsf)	PID (ppm)	Remarks
						Brown, Fine SAND and SILT (TOPSOIL)			
1		8	D	37				0.0	
						Brown, Silty SAND with Cobbles (SM)			
2		6	D	29	5			0.0	
3		10	M	39	▽	Brown, Silty SAND and GRAVEL (GS)		0.0	
4		14	W	39		Gray, Silty SAND and GRAVEL, Some Cobbles (GS)		0.0	
					10				
5		3	W	28				0.0	
6		6	M	35				0.0	
					15				
						Gray, Stiff CLAY (CL)			
7		13	M	23				0.0	
						End of Boring at 17.5 ft			
					20				
					25				
					30				

WATER LEVEL OBSERVATIONS

While Drilling ▽ 6.5 ft. Upon Completion of Drilling ▼ ft.
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 10/6/97 End 10/6/97
Driller Rock&SoilChief Rig Acker
Logger BPG Editor
Drill Method Rotary 4 1/4 " ID HSA; 18" SS on 2 1/2' Centers

Cor3\BLAC2_ID: CHICAGO

MONTGOMERY WATSON

LOG OF TEST BORING

Project: Blackwell Forest Preserve

Location: Warrenville, Illinois

Boring No. G145
Job No. 1252008.051602
Sheet 1 of 3
Surface Elevation
Northing:
Easting:

2100 Corporate Drive, Addison, Illinois 60101, TEL. (708) 691-5000

SAMPLE No.	Type	Rec. (in.)	Moisture	N Value	Depth (ft.)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	PID (ppm)	Remarks
						Brown, Silty, Organic SILT, Some Clay, Little Gravel, Some Roots (ML)			
1		15	D	39				0.0	
2		8	M	18		Gray CLAY, Trace Gravel and Silt (CL)		0.0	
					5				
3		18	M	13				0.0	
4		5	M	26				0.0	
					10				
5		13	D	35		Light Brown, Fine SAND and SILT, Little Gravel (SM)		0.0	
6		14	D	45		Fine to Medium SAND at 14.0 ft		0.0	
					15				Spoon wet.
7		11	W	56		Brown/Gray, Fine to Coarse SAND, Some Gravel (SP)		0.0	
8		12	W	26		Light Brown CLAY, Trace Gravel (CL)		0.0	Sand blowing into augers.
					20				
9		13	W	27		Gray, Fine to Medium SAND (SP) / Gray, Fine to Coarse SAND, Little Gravel (SP)		0.0	Sand blowing into augers.
10		18	W	34				0.0	Sand blowing into augers.
					25				
11		18	W	43				0.0	Sand blowing into augers.
12				NA		No Sample, 2.0 ft Blow-in			Sand blowing into augers.
					30				

WATER LEVEL OBSERVATIONS

While Drilling ▽ ft. Upon Completion of Drilling ▼ ft.
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 10/3/97 End 10/3/97
Driller Rock&SoilChief Rig Acker
Logger AMH Editor
Drill Method Rotary 3 3/4 " ID HSA; 6 1/4" ID HSA ; 3 7/8" roller bit

MONTGOMERY WATSON

LOG OF TEST BORING

Project: Blackwell Forest Preserve

Location: Warrenville, Illinois

Boring No. G145
Job No. 1252008.051602
Sheet 2 of 3
Surface Elevation
Northing:
Easting:

2100 Corporate Drive, Addison, Illinois 60101, TEL. (708) 691-5000

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES		
No.	Type	Rec. (in.)	Moisture	N Value	Depth (ft.)		qu (qa) (tsf)	PID (ppm)	Remarks
13		18	W	44				0.0	Add water to augers to maintain head against blow-in.
14		18	W	39				0.0	
					35	No Sample, 2.0 ft Blow-in			
15		4	W	NA		2.0 ft Blow-in		0.0	
					40	No Sample			Driller reports difficult drilling (clay) at 42'.
						Gray, Stiff CLAY, Trace Gravel (CL)			
16		8	M	30				0.0	
					45				
17		18	M	54				0.0	Drill to 45' w/ 3 3/4" ID HSA; withdraw and drill to bedrock with 6 1/4" ID HSA.
18				NA		LIMESTONE/DOLOMITE Bedrock, Very Fractured, Weathered, Broken up (LIMESTONE)			SS/Auger refusal at 48.5'. Driller reports bedrock is fractured and weathered to 53'. 4" ID steel casing set at 54'. Driller reports that bedrock seams less competent than at G146; drilling rate faster.
					50				
						LIMESTONE/DOLOMITE Bedrock (LIMESTONE)			
					55				
					60				

MONTGOMERY WATSON

LOG OF TEST BORING

Project: Blackwell Forest Preserve

Location: Warrenville, Illinois

Boring No. G145
Job No. 1252008.051602
Sheet 3 of 3
Surface Elevation
Northing:
Easting:

2100 Corporate Drive, Addison, Illinois 60101, TEL. (708) 691-5000

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES		
No.	Rec. (in.)	Mois-ture	N Value	Depth (ft.)		qu (qa) (tsf)	PID (ppm)	Remarks
				65				Maintained water circulation. No water lost.
					End of Boring at 67.0 ft			
				70				
				75				
				80				
				85				
				90				
				95				

MONTGOMERY WATSON

LOG OF TEST BORING

Project: **Blackwell Forest Preserve**

Location: **Warrenville, Illinois**

Boring No. **G146**
Job No. **1252008.051602**
Sheet **1 of 3**
Surface Elevation
Northing:
Easting:

2100 Corporate Drive, Addison, Illinois 60101, TEL. (708) 691-5000

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES		
No.	Type	Rec. (in.)	Moisture	N Value	Depth (ft.)		qu (qa) (tsf)	PID (ppm)	Remarks
						Brown/Gray SAND and GRAVEL (GS)			Boring drilled with no sampling. See boring log P3 for stratigraphy.
					5	Red/Brown, Silty CLAY, Little Sand (CL)			Soil descriptions based on surface soil cuttings. Driller says drilling difficult due to gravel and some clay.
					10	Light Brown SAND and GRAVEL (GS)			
						Brown/Gray SILT and Fine Sand, Trace Gravel (ML)			
					15	GRAVEL (GP)			Driller says drilling much easier at 15'.
						Brown SAND and GRAVEL, Little Clay and Silt (GS)			
					20	GRAVEL (GP)			
					25				
					30				

WATER LEVEL OBSERVATIONS

While Drilling ▽ ____ ft. Upon Completion of Drilling ▼ ____ ft.
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **10/1/97** End **10/1/97**
Driller **Rock&SoilChief** Rig **Acker**
Logger **AMH** Editor
Drill Method **Rotary 6 1/4 " ID HSA; 3 7/8" roller bit**

MONTGOMERY WATSON

LOG OF TEST BORING

Project: Blackwell Forest Preserve

Location: Warrenville, Illinois

Boring No. G146
Job No. 1252008.051602
Sheet 2 of 3
Surface Elevation
Northing:
Easting:

2100 Corporate Drive, Addison, Illinois 60101, TEL. (708) 691-5000

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES		
No.	Rec. (in.)	Mois-ture	N Value	Depth (ft.)		qu (qa) (tsf)	PID (ppm)	Remarks
				35				Driller reports drilling becoming more difficult
				40	Brown SAND and GRAVEL (GS)			
				45				
				50				
				55	LIMESTONE/DOLOMITE Bedrock (LIMESTONE)			Auger refusal a 55'. Set 4" ID steel casing at 56'. Drill through bedrock with 3 7/8" roller bit. Driller reports bedrock is competent.
				60				

MONTGOMERY WATSON

LOG OF TEST BORING

Project: Blackwell Forest Preserve

Location: Warrenville, Illinois

Boring No. G146
Job No. 1252008.051602
Sheet 3 of 3
Surface Elevation
Northing:
Easting:

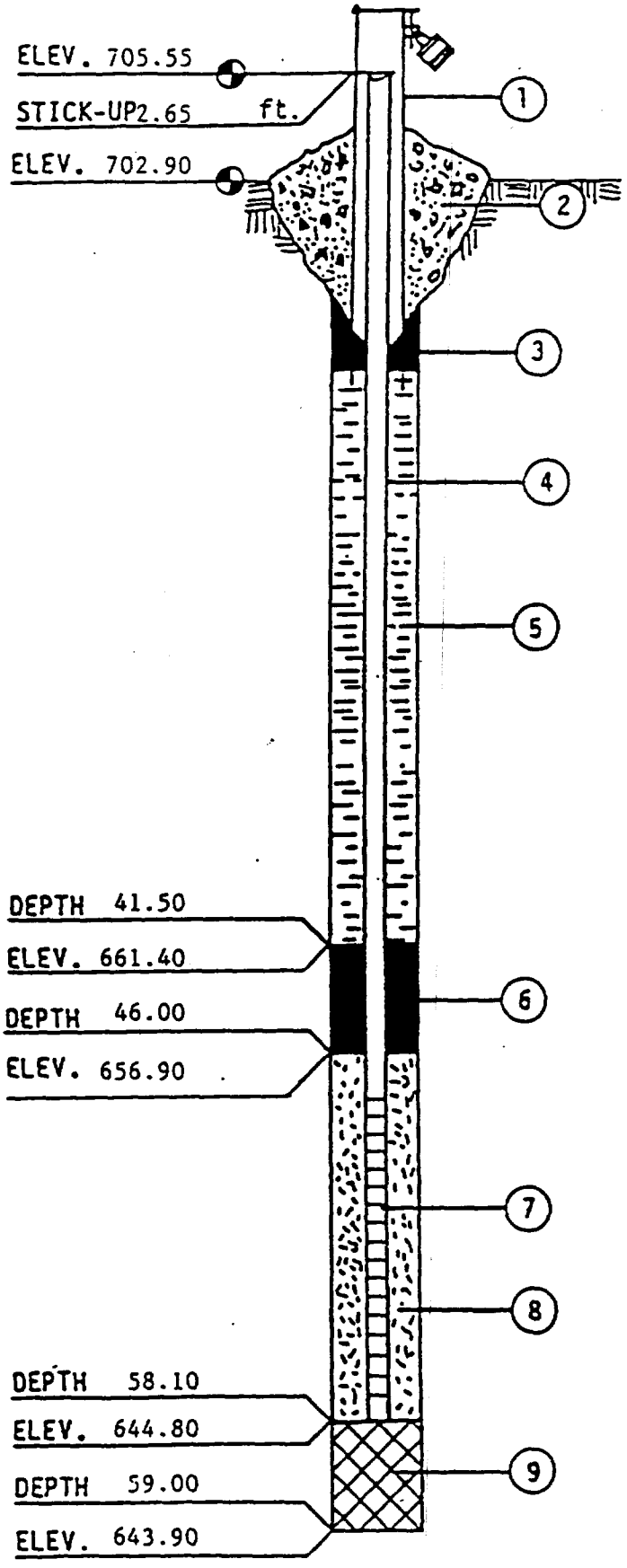
2100 Corporate Drive, Addison, Illinois 60101, TEL. (708) 691-5000

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES		
No.	Rec. (in.)	Moisture	N Value	Depth (ft.)		qu (qa) (tsf)	PID (ppm)	Remarks
				65				Maintained water circulation. No water lost.
				70	End of Boring at 68.7 ft			
				75				
				80				
				85				
				90				
				95				

B

APPENDIX B

MONITORING WELL/PIEZOMETER CONSTRUCTION DETAILS



WARZYN

Monitoring Well Construction Information

Project Number 60721

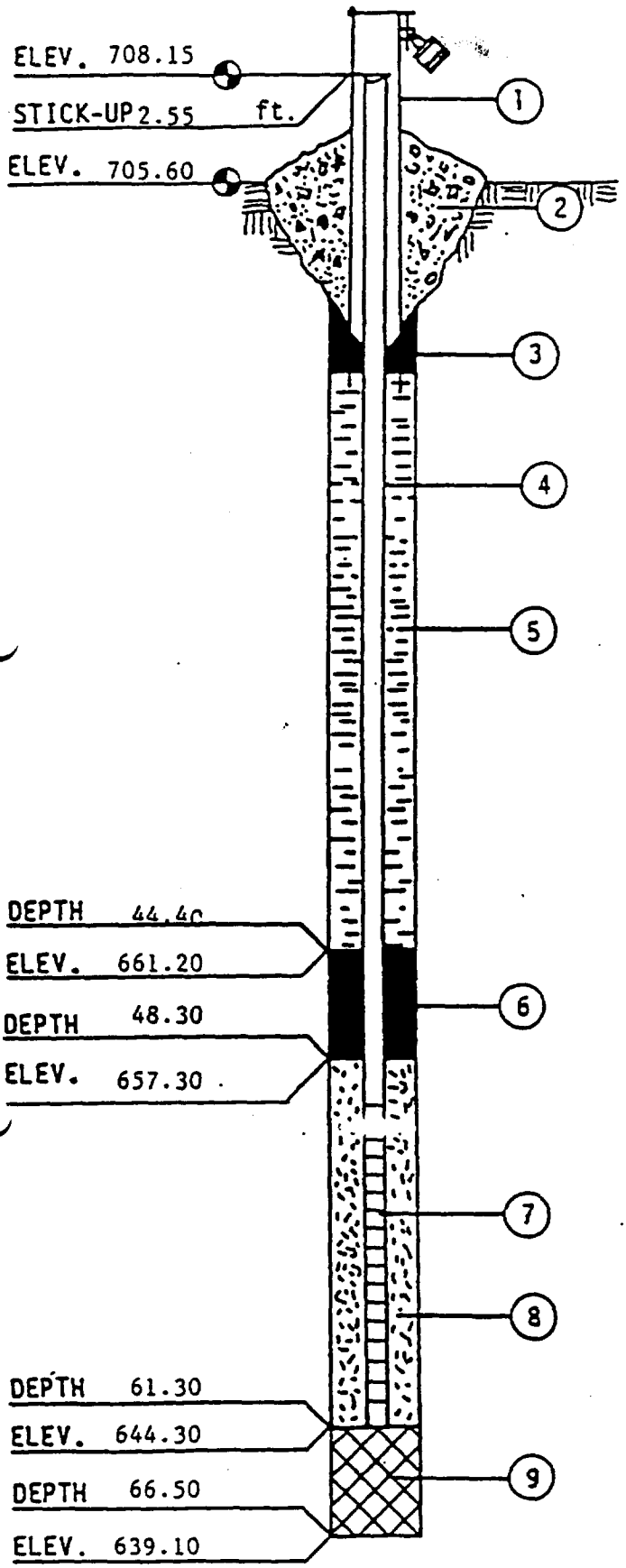
Description Blackwell

Boring/ Well No G-140D Date 6/16/91

1. Protective Casing Yes
   Locking Yes
2. Concrete Seal Yes
3. Type of Surface Seal (if Installed) 304 Stainless Steel
4. Solid Pipe Type
   Solid Pipe Length 50.0
   Joint Type Threaded
5. Type of Backfill Bentonite-Cement
   Backfill Installed Tremie
6. Type of Lower Seal (if Installed) Bentonite Pellets
7. Screen Type Stainless Steel
   Screen Length 10.60
   Slot Size 0.010
   Slotted Interval Length 10.3 ft.
   Screen Diameter 2 inch
8. Type of Backfill around Screen Merramec Warrior Sand
9. Type of Backfill Drill Cuttings
10. Drilling Method 4-1/4" HSA
11. Additives Used (if any) None

All Depths Measured from Ground Surface
Water Level 14.6 Date 6/17/91

[CHI-801-27]



WARZYN

Monitoring Well Construction Information

Project Number 60721

Description Blackwell

Boring/ Well No G-141D Date 6/18/91

1. Protective Casing Yes

   Locking Yes

2. Concrete Seal Yes

3. Type of Surface Seal (if Installed)

4. Solid Pipe Type 304 Stainless Steel

   Solid Pipe Length 53.3

   Joint Type Threaded

5. Type of Backfill Bentonite-Cement

   Backfill Installed Tremie

6. Type of Lower Seal (if installed) Bentonite Pellets

7. Screen Type Stainless Steel

   Screen Length 10.7

   Slot Size 0.010

   Slotted Interval Length 10.3 ft.

   Screen Diameter 2 inch

8. Type of Backfill around Screen Colorado Silica Sand

9. Type of Backfill Drill Cuttings

10. Drilling Method 4-1/4" HSA

11. Additives Used (if any)

None

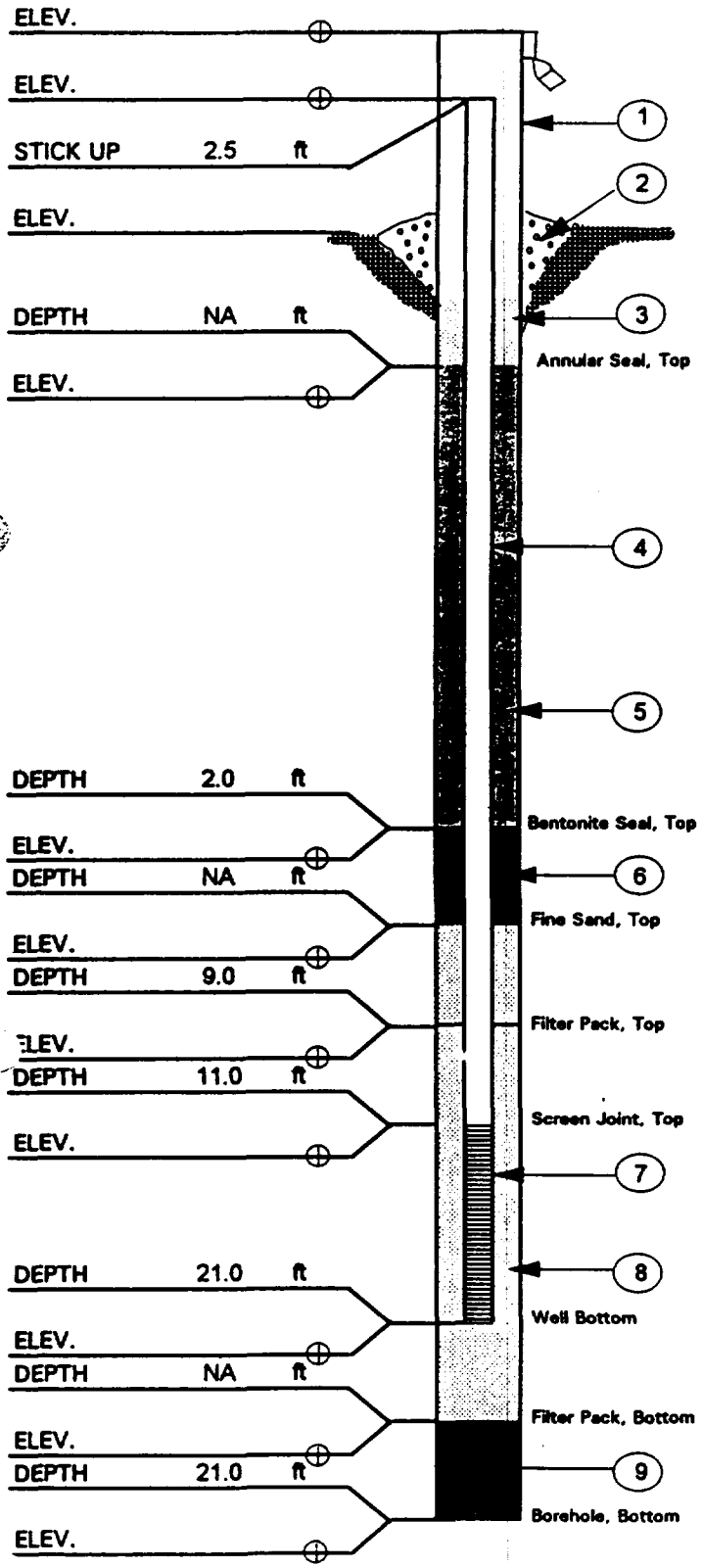
All Depths Measured from Ground Surface

Water Level 16.59 Date 6/19/91

[CHI-801-27]

MONTGOMERY WATSON

MONITORING WELL DETAIL SHEET



PROJECT: Blackwell Forest Preserve

BORING/WELL NO.: G142

DATE: 10-6-97

PROJECT NUMBER: 1252008.051602

1. PROTECTIVE CASING
   DIMENSIONS — LENGTH 5.0 ft; DIAMETER 6x6" squar
   LOCK? X YES ___ NO
   VENTED WELL CAP? X YES ___ NO
2. SURFICIAL SEAL MATERIAL: Concrete
3. SAND DRAINAGE? ___ YES X NO
4. SOLID PIPE TYPE: Type 304 Stainless Steel
   SOLID PIPE LENGTH: ___ ft
5. ANNULAR SEAL MATERIAL: NA
   HOW INSTALLED: NA
   VOLUME PLACED: NA ft
6. BENTONITE SEAL: Bentontie Chips
   VOLUME PLACED: 150 lbs. = 1.5 ft
7. SCREEN MATERIAL: Type 304 Stainless Steel
   SCREEN MANUFACTURER: Johnson-Wheelabrator
   SCREEN LENGTH: 10.0 ft
   SLOT SIZE: 0.010 in.
   SLOTTED INTERVAL LENGTH: 9.7 ft
   SCREEN DIAMETER I.D. ___ in. O.D. ___ in.
8. FILTER PACK MATERIAL: No. 5 Silica Sand
   VOLUME ADDED: 200 lb = 2.0 ft
9. BACKFILL MATERIAL (BELOW FILTER PACK)
   None
10. DRILLING METHOD: Rotary with 4 1/4" I.D. HSA
11. BOREHOLE DIAMETER: 8.0 in.

INSTALLED BY: Rock & Soil SUPERVISED BY: AMH

(ALL DEPTHS MEASURED FROM GROUND SURFACE)

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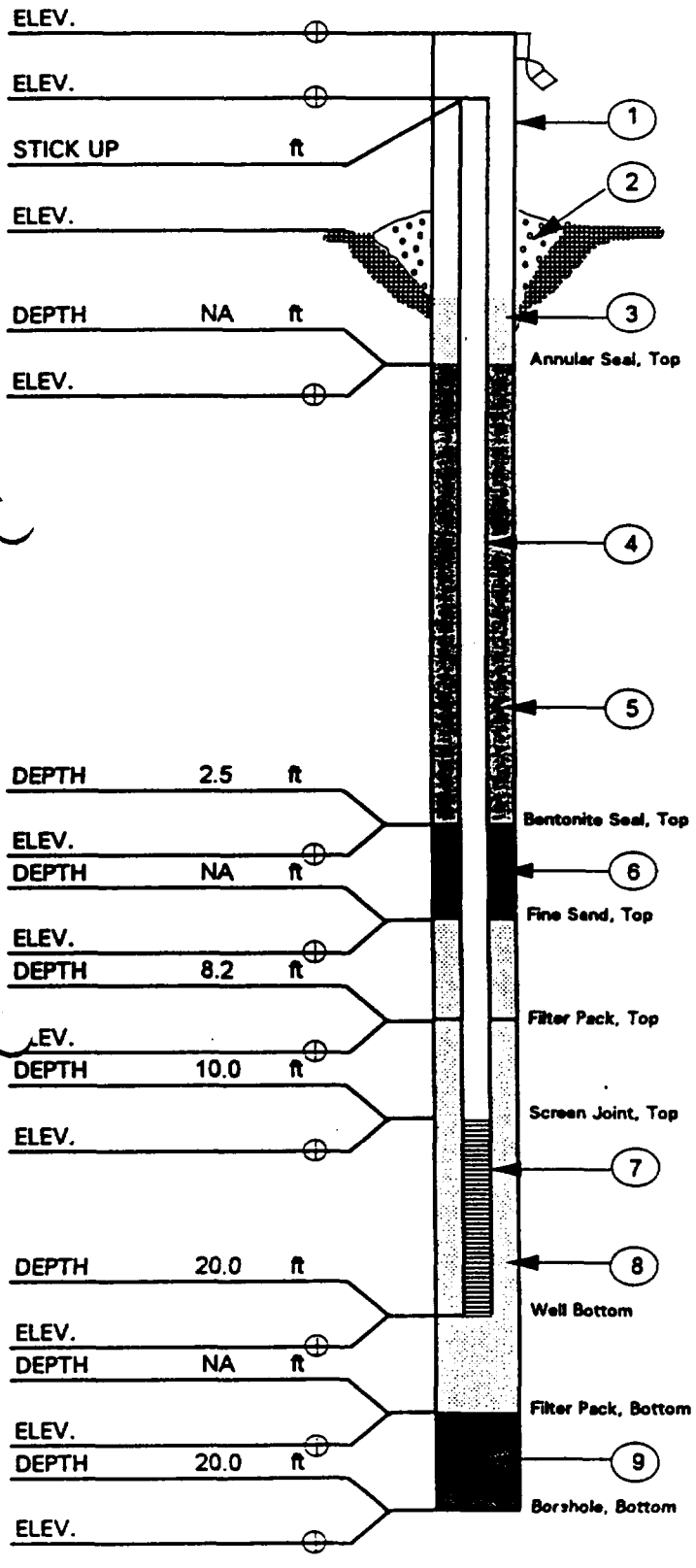
MONTGOMERY WATSON

MONITORING WELL DETAIL SHEET



PROJECT: Blackwell Forest Preserve

BORING/WELL NO.: G143

DATE: 10-1-97

PROJECT NUMBER: 1252008.051602

1. PROTECTIVE CASING
   - DIMENSIONS: LENGTH 5.0 ft; DIAMETER 6x6" square
   - LOCK? X YES ___ NO
   - VENTED WELL CAP? X YES ___ NO
2. SURFICIAL SEAL MATERIAL: ___
3. SAND DRAINAGE? ___ YES X NO
4. SOLID PIPE TYPE: Type 304 Stainless Steel
   - SOLID PIPE LENGTH: ___ ft
5. ANNULAR SEAL MATERIAL: NA
   - HOW INSTALLED: NA
   - VOLUME PLACED: NA ft³
6. BENTONITE SEAL: Bentontie Chips
   - VOLUME PLACED: 150 lbs. = 1.5 ft³
7. SCREEN MATERIAL: Type 304 Stainless Steel
   - SCREEN MANUFACTURER: Johnson-Wheelabrator
   - SCREEN LENGTH: 10.0 ft
   - SLOT SIZE: 0.010 in.
   - SLOTTED INTERVAL LENGTH: 9.7 ft
   - SCREEN DIAMETER I.D. ___ in. O.D. ___ in.
8. FILTER PACK MATERIAL: No. 5 Silica Sand
   - VOLUME ADDED: 200 lb = 1.5 ft³
9. BACKFILL MATERIAL (BELOW FILTER PACK): None
10. DRILLING METHOD: Rotary with 4 1/4" I.D. HSA
11. BOREHOLE DIAMETER: 8.0 in.

INSTALLED BY: Rock & Soil SUPERVISED BY: AMH

(ALL DEPTHS MEASURED FROM GROUND SURFACE)

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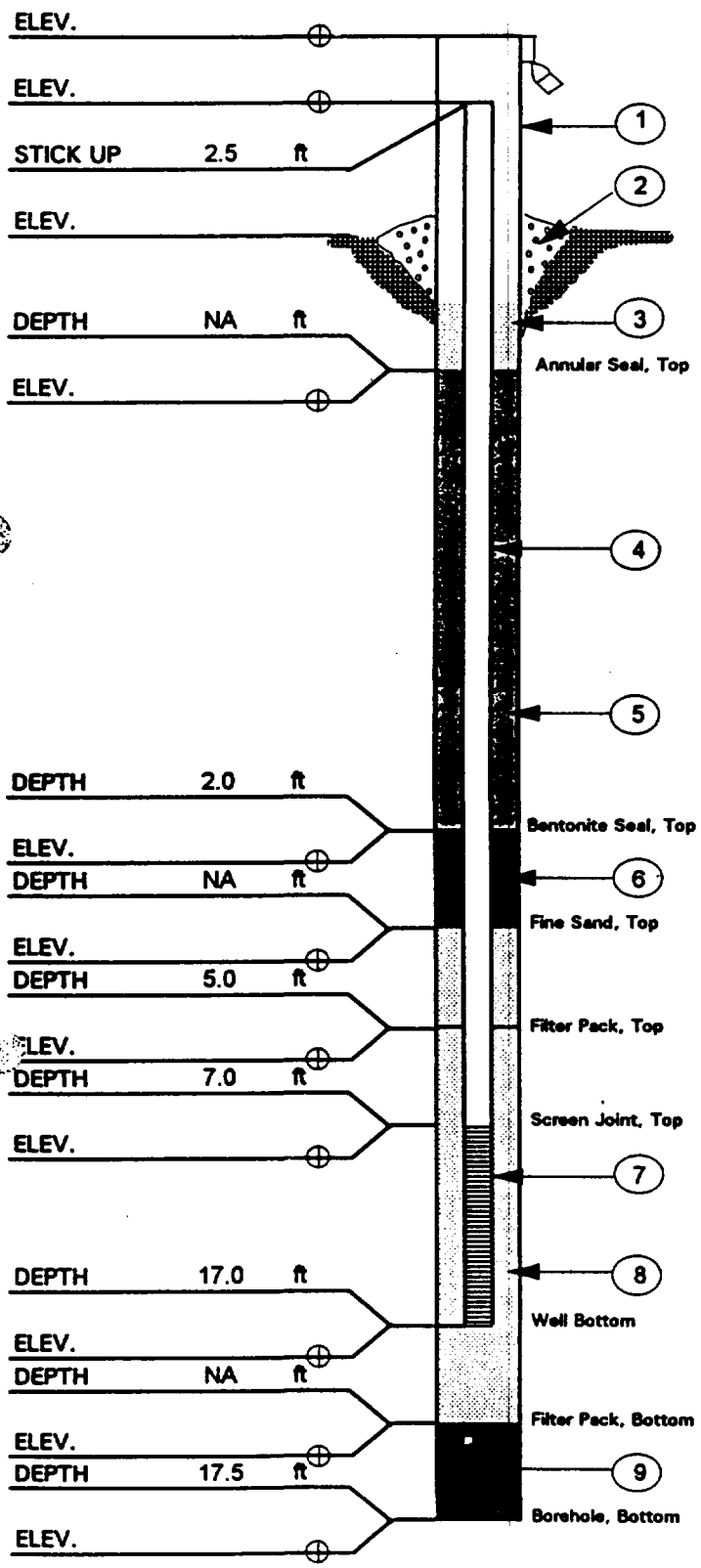
MONTGOMERY WATSON

MONITORING WELL DETAIL SHEET



PROJECT: Blackwell Forest Preserve

BORING/WELL NO.: G144

DATE: 10-6-97

PROJECT NUMBER: 1252008.051602

1. PROTECTIVE CASING
   - DIMENSIONS: LENGTH 5.0 ft; DIAMETER 6x6" square
   - LOCK? X YES ___ NO
   - VENTED WELL CAP? X YES ___ NO
2. SURFICIAL SEAL MATERIAL: Concrete
3. SAND DRAINAGE? ___ YES X NO
4. SOLID PIPE TYPE: Type 304 Stainless Steel
   - SOLID PIPE LENGTH: ___ ft
5. ANNULAR SEAL MATERIAL: NA
   - HOW INSTALLED: NA
   - VOLUME PLACED: NA ft
6. BENTONITE SEAL: Bentontie Chips
   - VOLUME PLACED: 50 lbs = 0.5 ft
7. SCREEN MATERIAL: Type 304 Stainless Steel
   - SCREEN MANUFACTURER: Johnson-Wheelabrator
   - SCREEN LENGTH: 10.0 ft
   - SLOT SIZE: 0.010 in.
   - SLOTTED INTERVAL LENGTH: 9.7 ft
   - SCREEN DIAMETER I.D. ___ in. O.D. ___ in.
8. FILTER PACK MATERIAL: No. 5 Silica Sand
   - VOLUME ADDED: 200 lbs = 2.0 ft
9. BACKFILL MATERIAL (BELOW FILTER PACK): None
10. DRILLING METHOD: Rotary with 4 1/4" I.D. HSA
11. BOREHOLE DIAMETER: 8.0 in.

INSTALLED BY: Rock & Soil SUPERVISED BY: BPG

(ALL DEPTHS MEASURED FROM GROUND SURFACE)

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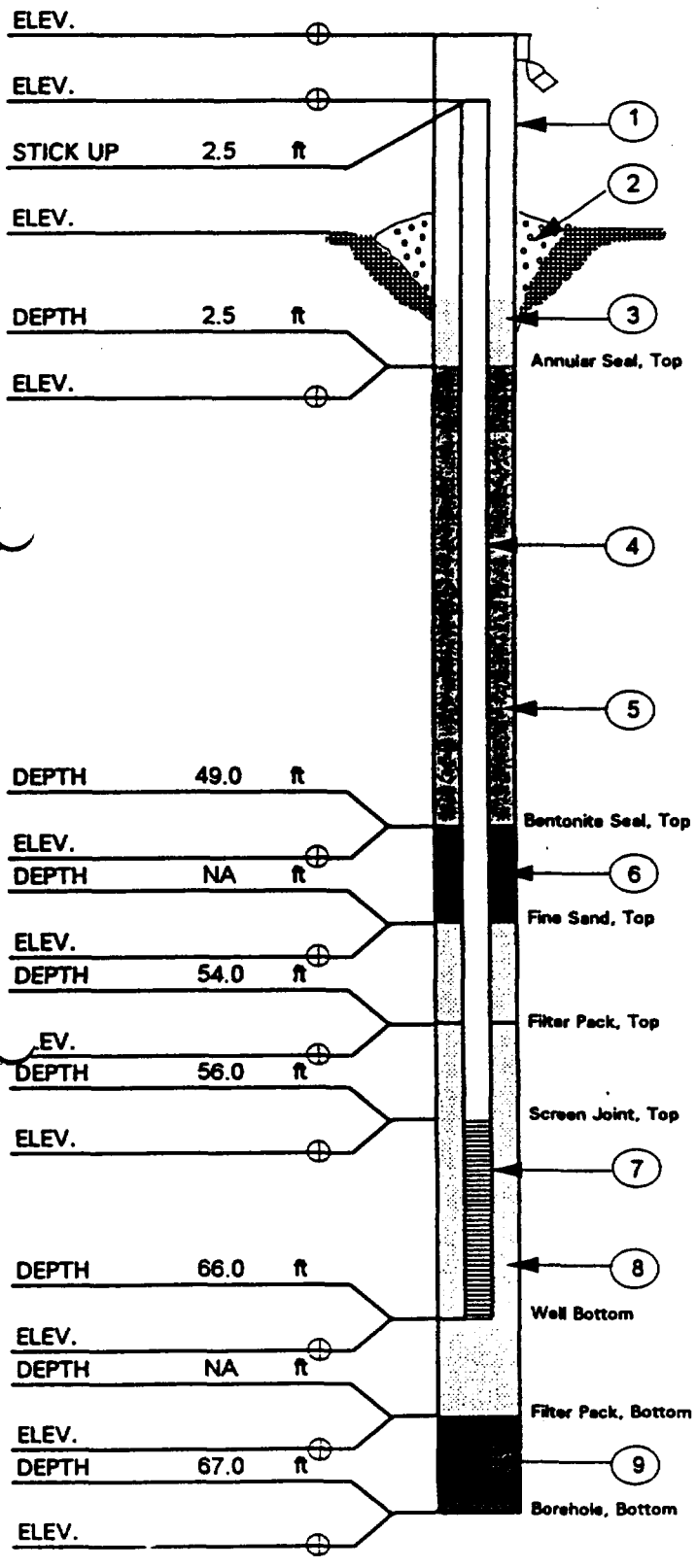
MONTGOMERY WATSON

MONITORING WELL DETAIL SHEET



PROJECT: Blackwell Forest Preserve

BORING/WELL NO.: G145

DATE: 10-3-97

PROJECT NUMBER: 1252008.051602

1. PROTECTIVE CASING
   DIMENSIONS — LENGTH 5.0 ft.; DIAMETER 6x6" square
   LOCK? X YES ___ NO
   VENTED WELL CAP? X YES ___ NO
2. SURFICIAL SEAL MATERIAL: Concrete
3. SAND DRAINAGE? ___ YES X NO
4. SOLID PIPE TYPE: Type 304 Stainless Steel
   SOLID PIPE LENGTH: ___ ft
5. ANNULAR SEAL MATERIAL: Bentonite Grout
   HOW INSTALLED: Tremie
   VOLUME PLACED: 30 gals = 4.0 ft³
6. BENTONITE SEAL: Bentontie Chips
   VOLUME PLACED: 40 lbs = 0.5 ft³
7. SCREEN MATERIAL: Type 304 Stainless Steel
   SCREEN MANUFACTURER: Johnson-Wheelabrator
   SCREEN LENGTH: 10.0 ft
   SLOT SIZE: 0.010 in.
   SLOTTED INTERVAL LENGTH: 9.7 ft
   SCREEN DIAMETER I.D. ___ in. O.D. ___ in.
8. FILTER PACK MATERIAL: No. 5 Silica Sand
   VOLUME ADDED: 75 lbs = 0.75 ft³
9. BACKFILL MATERIAL (BELOW FILTER PACK): No. 5 Silica Sand
10. DRILLING METHOD: Rotary using HSA through Soil. Rotary with water using roller bit in bedrock.
11. BOREHOLE DIAMETER: 10.0 in.

INSTALLED BY: Rock & Soil SUPERVISED BY: AMH

(ALL DEPTHS MEASURED FROM GROUND SURFACE)

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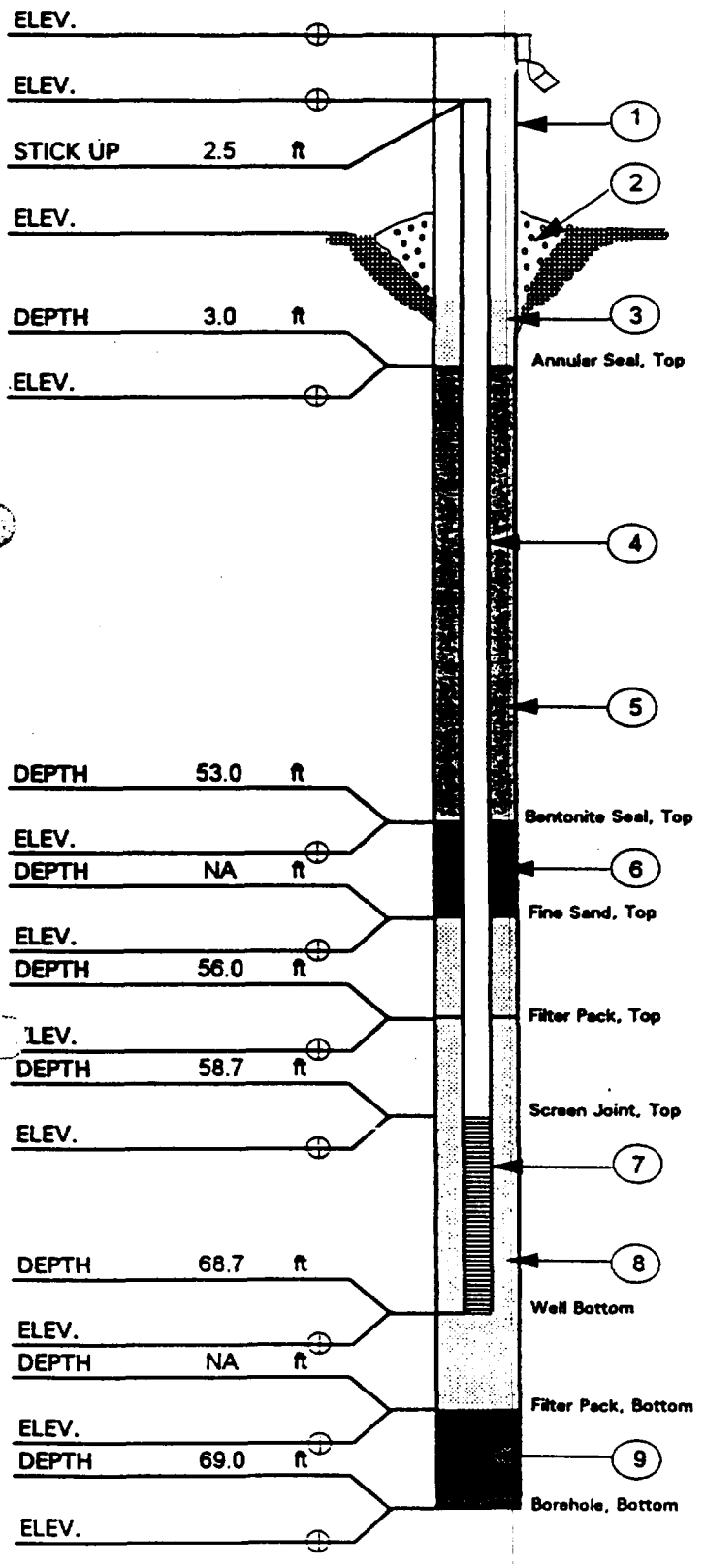
MONTGOMERY WATSON

MONITORING WELL DETAIL SHEET



PROJECT: Blackwell Forest Preserve

BORING/WELL NO.: G146

DATE: 10-1-97

PROJECT NUMBER: 1252008.051602

1. PROTECTIVE CASING
   DIMENSIONS — LENGTH: 5.0 ft.; DIAMETER: 6x6" square
   LOCK? X YES ___ NO
   VENTED WELL CAP? X YES ___ NO
2. SURFICIAL SEAL MATERIAL: Concrete
3. SAND DRAINAGE? ___ YES X NO
4. SOLID PIPE TYPE: Type 304 Stainless Steel
   SOLID PIPE LENGTH: ___ ft
5. ANNULAR SEAL MATERIAL: Bentonite Grout
   HOW INSTALLED: Tremie
   VOLUME PLACED: 30 gallons=4.0 ft^3
6. BENTONITE SEAL: Bentontie Chips
   VOLUME PLACED: 25 lbs = 0.25 ft^3
7. SCREEN MATERIAL: Type 304 Stainless Steel
   SCREEN MANUFACTURER: Johnson-Wheelabrator
   SCREEN LENGTH: 10.0 ft
   SLOT SIZE: 0.010 in.
   SLOTTED INTERVAL LENGTH: 9.7 ft
   SCREEN DIAMETER I.D. ___ in. O.D. ___ in.
8. FILTER PACK MATERIAL: No. 5 Silica Sand
   VOLUME ADDED: 80 lb = 0.75 ft^3
9. BACKFILL MATERIAL (BELOW FILTER PACK): None
10. DRILLING METHOD: Rotary using HSA through Soil. Rotary with water using roller bit in bedrock.
11. BOREHOLE DIAMETER: 10.0 in.

INSTALLED BY: Rock & Soil SUPERVISED BY: AMH

(ALL DEPTHS MEASURED FROM GROUND SURFACE)

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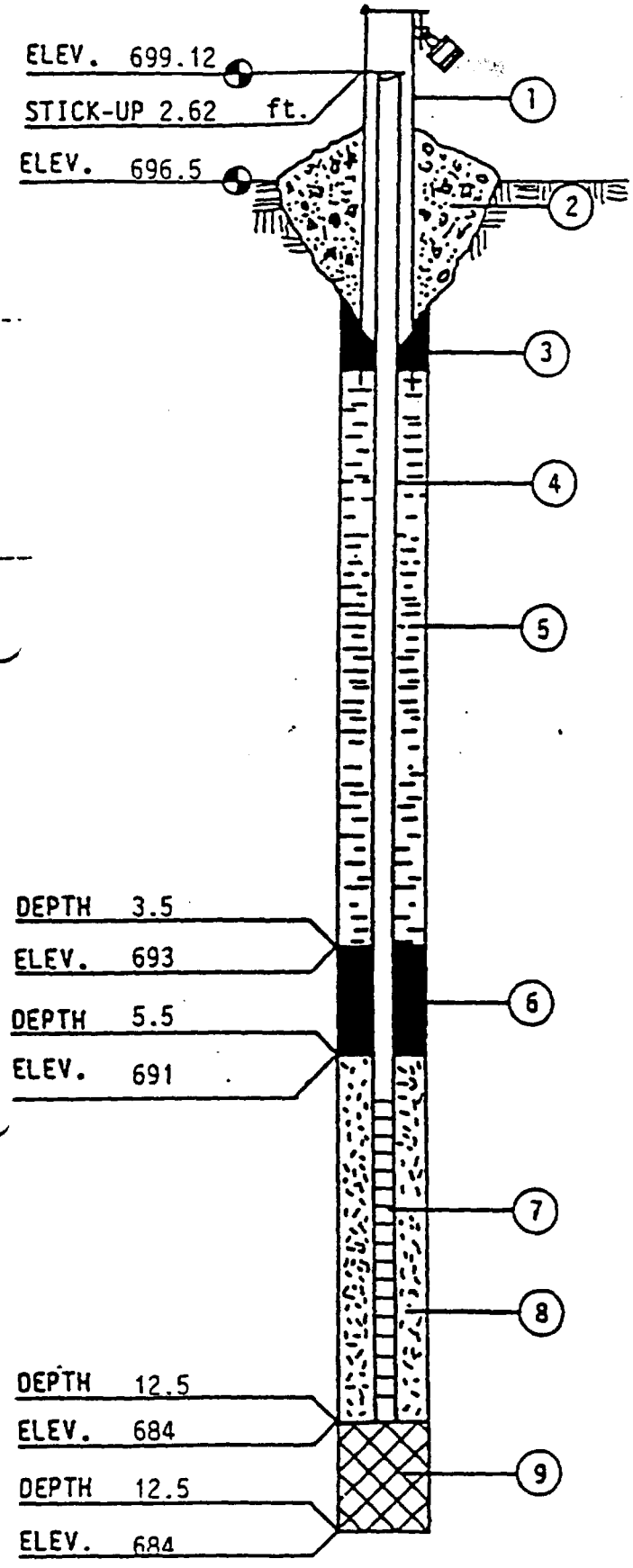

WARZYN

Monitoring Well Construction Information

Project Number: 60721

Description: Blackwell

Boring/ Well No: PZ-2 Date: 6-3-91

1. Protective Casing: yes
   Locking: yes
2. Concrete Seal: yes
3. Type of Surface Seal (if Installed):
4. Solid Pipe Type: Schedule 40 PVC
   Solid Pipe Length: 10.12 ft.
   Joint Type: Threaded
5. Type of Backfill: cement-bentonite grout
   Backfill Installed from surface
6. Type of Lower Seal (if installed): bentonite pellets
7. Screen Type: Sch 40 PVC
   Screen Length: 5 feet
   Slot Size: 0.010 inch
   Slotted Interval Length: 5 feet
   Screen Diameter: 2 inches
8. Type of Backfill around Screen: Merramac Warrior Sand
9. Type of Backfill:
10. Drilling Method: 4.25" IDHSA
11. Additives Used (if any): none

All Depths Measured from Ground Surface

APPENDIX C

MONITORING WELL/PIEZOMETER INTEGRITY EVALUATION FORMS

MONTGOMERY WATSON

Blackwell Landfill NPL Site
Well Integrity Survey

Date: 9/24/97
Monitoring Well No.: P-2

Monitoring Well Lock :	(Satisfactory) or Unsatisfactory	Remarks: Bolt-cutted lock off; replaced immed. w/ FPD master lock
Monitoring Well Secure	(Yes) or No	Remarks:
Protective Casing:	(Satisfactory) or Unsatisfactory	Remarks:
Material Between Casings:	Yes or (No)	Remarks:
Surface Seal Defects:	Cracked, Weak, or (None)	Remarks:
Well Casing Vent Hole	Yes or (No)	Remarks: Put vent hole in
Kinking or Obstructions	Yes or (No)	Remarks:
Photograph of Monitoring Well	(Yes) or No	Remarks:
Screen Type:	(PVC), SS or other	Remarks:
Total Depth of Well:	14.94 ft	Remarks: TOIC/ Compared to historical info = 15.16 TOIC
Well Diameter:	2 in	Remarks:
Depth to Water Level from TOIC:	7.78 ft	Remarks:

Signature: Brian P. Greiser

MONTGOMERY WATSON

Blackwell Landfill NPL Site
Well Integrity Survey

Date: 9/24/97
Monitoring Well No.: G130

Monitoring Well Lock :	(Satisfactory) or Unsatisfactory	Remarks:
Monitoring Well Secure	(Yes) or No	Remarks:
Protective Casing:	(Satisfactory) or Unsatisfactory	Remarks:
Material Between Casings:	Yes or (No)	Remarks: Material found @ ground level only
Surface Seal Defects:	Cracked, (Weak), or None	Remarks: Surface Seal heaved 6-8"
Well Casing Vent Hole	Yes or (No)	Remarks: Put one in
Kinking or Obstructions	Yes or (No)	Remarks:
Photograph of Monitoring Well	(Yes) or No	Remarks:
Screen Type:	(PVC), SS or other	Remarks:
Total Depth of Well:	24.1 ft	Remarks: Compared to historical info. = 23' TOIC
Well Diameter:	4 in	Remarks:
Depth to Water Level from TOIC:	16.91 ft	Remarks:

Signature: Brian P. Gressman

MONTGOMERY WATSON

Blackwell Landfill NPL Site
Well Integrity Survey

Date: 9/29/97
Monitoring Well No.: G-13i D

Monitoring Well Lock :	(Satisfactory) or Unsatisfactory	Remarks:
Monitoring Well Secure	(Yes) or No	Remarks:
Protective Casing:	(Satisfactory) or Unsatisfactory	Remarks:
Material Between Casings:	(Yes) or No	Remarks: 5" below grand surface
Surface Seal Defects:	Cracked, (Weak) or None	Remarks: heaved 1 inch
Well Casing Vent Hole	Yes or (No)	Remarks:
Kinking or Obstructions	Yes or (No)	Remarks:
Photograph of Monitoring Well	(Yes) or No	Remarks:
Screen Type:	(PVC), SS or other	Remarks:
Total Depth of Well:	54.1 ft	Remarks: Boring log: 53' bgs
Well Diameter:	4 in	Remarks:
Depth to Water Level from TOIC:	14.45 ft	Remarks:

Signature: [signature]

Dedicated Bailer

MONTGOMERY WATSON

Blackwell Landfill NPL Site
Well Integrity Survey

Date: 9/23/97
Monitoring Well No.: G131DD

Monitoring Well Lock :	(Satisfactory) or Unsatisfactory	Remarks: lock has some rust
Monitoring Well Secure	(Yes) or No	Remarks:
Protective Casing:	(Satisfactory) or Unsatisfactory	Remarks:
Material Between Casings:	Yes or (No)	Remarks: Material is found @ ground level only
Surface Seal Defects:	Cracked, Weak, or (None)	Remarks:
Well Casing Vent Hole	Yes or (No)	Remarks: Put one in
Kinking or Obstructions	Yes or (No)	Remarks:
Photograph of Monitoring Well	(Yes) or No	Remarks:
Screen Type:	(PVC) SS or other	Remarks:
Total Depth of Well:	64.6 ft	Remarks: TOIC / Compared to historical info = 63' bgs
Well Diameter:	4 in	Remarks:
Depth to Water Level from TOIC:	14.7 ft	Remarks:

Signature: Brian P. Gleason

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MONTGOMERY WATSON

Blackwell Landfill NPL Site
Well Integrity Survey

Date: 9/23/97
Monitoring Well No.: G132D

Monitoring Well Lock :	(Satisfactory) or Unsatisfactory	Remarks:
Monitoring Well Secure	(Yes) or No	Remarks:
Protective Casing:	(Satisfactory) or Unsatisfactory	Remarks:
Material Between Casings:	Yes or (No)	Remarks: Material @ ground level only
Surface Seal Defects:	Cracked, Weak, or (None)	Remarks:
Well Casing Vent Hole	Yes or (No)	Remarks: Put hole in
Kinking or Obstructions	Yes or (No)	Remarks:
Photograph of Monitoring Well	(Yes) or No	Remarks:
Screen Type:	(PVC) SS or other	Remarks:
Total Depth of Well:	88.1 ft	Remarks: Boring log 83 ft bgs. Compared to historical info. / TOIC
Well Diameter:	4" in	Remarks:
Depth to Water Level from TOIC:	28.1 ft	Remarks:
Signature:	Brian Haas	

MONTGOMERY WATSON

Blackwell Landfill NPL Site
Well Integrity Survey

Date: 9/23/97
Monitoring Well No.: 6134

Monitoring Well Lock :	(Satisfactory) or Unsatisfactory	Remarks:
Monitoring Well Secure	(Yes) or No	Remarks:
Protective Casing:	(Satisfactory) or Unsatisfactory	Remarks:
Material Between Casings:	Yes or (No)	Remarks: Material found @ grand level only
Surface Seal Defects:	Cracked, Weak, or (None)	Remarks:
Well Casing Vent Hole	Yes or (No)	Remarks: Put Vent hole in
Kinking or Obstructions	(Yes) or No	Remarks: Can not get dedicated bailer out
Photograph of Monitoring Well	(Yes) or No	Remarks:
Screen Type:	(PVC) SS or other	Remarks:
Total Depth of Well:	* ft	Remarks: boring log: well depth = 103.5 bgs. Could not measure total depth as well depth is > 100 ft.
Well Diameter:	4 in	Remarks:
Depth to Water Level from TOIC:	28 ft	Remarks:

Signature: Brian P. Shea

MONTGOMERY WATSON

Blackwell Landfill NPL Site
Well Integrity Survey

Date: 9/23/97
Monitoring Well No.: G135

Monitoring Well Lock :	(Satisfactory) or Unsatisfactory	Remarks:
Monitoring Well Secure	(Yes) or No	Remarks:
Protective Casing:	(Satisfactory) or Unsatisfactory	Remarks:
Material Between Casings:	Yes or (No)	Remarks: Material @ ground level only
Surface Seal Defects:	Cracked, Weak, or (None)	Remarks: Appears O.K, however it is 4-6" below ground surface
Well Casing Vent Hole	Yes or (No)	Remarks: Put vent hole in
Kinking or Obstructions	Yes or (No)	Remarks:
Photograph of Monitoring Well	(Yes) or No	Remarks:
Screen Type:	(PVC) SS or other	Remarks:
Total Depth of Well:	83.1 ft	Remarks: Boring log = 82' bgs Compared to hydrostatic info. / TOIC
Well Diameter:	4 in	Remarks:
Depth to Water Level from TOIC:	28.4 ft	Remarks:

Signature: Brian Thomas

MONTGOMERY WATSON

Blackwell Landfill NPL Site
Well Integrity Survey

Date: 9/23/97
Monitoring Well No.: G137

Monitoring Well Lock :	(Satisfactory) or Unsatisfactory	Remarks: Cut lock off and replaced w/new.
Monitoring Well Secure	(Yes) or No	Remarks:
Protective Casing:	(Satisfactory) or Unsatisfactory	Remarks:
Material Between Casings:	Yes or (No)	Remarks: Material @ ground level only
Surface Seal Defects:	Cracked, Weak, or (None)	Remarks: Good condition
Well Casing Vent Hole	Yes or (No)	Remarks: Put vent hole in
Kinking or Obstructions	Yes or (No)	Remarks:
Photograph of Monitoring Well	(Yes) or No	Remarks:
Screen Type:	(PVC) SS or other	Remarks:
Total Depth of Well:	57.9 ft	Remarks: Boring log = 53.5' bgs Compared to historical info. / TOIC
Well Diameter:	4 in	Remarks:
Depth to Water Level from TOIC:	10.5 ft	Remarks:

Signature: Brian Greene

D

APPENDIX D

MONITORING WELL DEVELOPMENT FORMS

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Forest Preserve | Well No.: G107S
Location: Warrenville, IL | Project No.: 1252008.051602
Developed By: JMK, BPG | Checked By:

1. Can this well be purged dry? ■ Yes ☐ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other: surged w/ pump periodically	☐

3. Time spent developing well: 85 min.

4. Total well depth (bgs) (From well construction summary): 390.0 ft.

Measured well depth (Before) (TOIC): 406 ft.

Measured well depth (After)) (TOIC): 402 ft.

5. Inside diameter of well: 4. in.

6. Volume of water in filter pack and well casing: 22.9 gal.

7. Volume of water removed from well: 105. gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None . gal.

9. Source of water added: _____

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 15.65 ft.	34.70
Date:	b. 9/25/97 (mm dd yy)	9/25/9 (mm dd yy)
	☐ a.m.	☐ a.m
Time:	c. 17 : 05 ■ p.m.	18 : 38 ■ p.m
11 Sediment in well bottom:	. inches	. inc
12 Water Observations:	Clear ☐ Turbid ■ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Light Gray	Clear
Odor		
Turbidity	Turbid	None
HNu		

Filter Pack Vol. (gallons) $0.16(R^2 - r^2)ls$ = 6.9

Well casing Vol. (gallons) $0.16r^2 l$ = 16.0

Saturated length of sand pack (ft.) (ls): 3.6

Length of water column (ft.) (l): 25.0

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered): _____ mg/l (BEFORE) _____ mg/l (AFTER)

14. COD (250 ml Unfiltered Sulfuric): _____ mg/l (BEFORE) _____ mg/l (AFTER)

Time	Gallons Purged	pH	Spec. Cond. (umhos/cm)	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb. (NTU)	DO (mg/L)	Comments
1719	20	7.29	208	11.21		Lt Gray		96.6	1.42	
1732	35	7.26	204	10.71		Cloudy		9.0	0.59	
1742	50	7.24	589	10.55		Clear		14.1	0.76	
1800	65	7.24	471	10.66		Clear		1.5	0.28	
1817	80	7.23	590	10.60		Clear		2.2	0.49	
1828	95	7.23	591	10.41		Clear		2.5	0.42	
1837	105	7.24	592	10.37		Clear		1.4	0.65	

Notes: 1. Purged dry at 23 gal.; 2. DO=Dissolved Oxygen

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G117
Location: DuPage County | Project No.: 3920.0041
Developed By: DAP/ACC | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other	☐

3. Time spent developing well: 90 min.

4. Total well depth ~~(TOC)~~ (GS): 290.0 ft.
(From well construction summary)

Measured well depth (Before): 300.0 ft.

Measured well depth (After): 300.0 ft.

5. Inside diameter of well: 4.00 in.

6. Volume of water in filter pack and well casing: 24.4 gal.

7. Volume of water removed from well: 2400.0 gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None gal.

9. Source of water added: None

	Before Development	After Development
10 Depth to Water (from top of well casing) a.	14.92 ft.	14.92 ft.
Date: b.	10 / 23 / 96 (mm dd yy)	10 / 24 / 96 (mm dd yy)
Time: c.	10 : 40 ■ a.m. ☐ p.m.	12 : 00 ☐ a.m. ■ p.m.
11 Sediment in well bottom:	-- . -- inches	-- . -- inches
12 Water Observations:	Clear ■ Turbid ☐ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Clear	Clear
Odor	None	None
Turbidity	None	None
HNu	N/A	N/A

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 14.3

Well casing Vol. (gallons) $0.16r^2l$ = 9.7

Saturated length of sand pack (ft.) (ls) 12.0

Length of water column (ft.) (l) 15.08

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

	(BEFORE)	(AFTER)
13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l	_____ mg/l

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Meter Turb.	D.O.	Comment
1052	30	6.60	700	12.5		Clear	None	0.19	2.2	
1100	50	6.90	685	12.6		Clear	None	--	2.19	
1115	100	7.20	588	12.5		Clear	None	0.10	2.15	
1130	150	7.34	570	12.5		Clear	None	0.10	2.15	
1144	200	7.40	570	12.5		Clear	None	0.02	2.1	
1200	240	7.54	574	12.5		Clear	None	0.02	2.13	

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Forest Preserve | Well No.: G118S
Location: Warrenville, IL | Project No.: 1252008.051602
Developed By: JMK, BPG | Checked By:

1. Can this well be purged dry? ■ Yes ☐ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other: surged w/ pump periodically	☐

3. Time spent developing well: 56 min.

4. Total well depth (bgs) (From well construction summary): 210.0 ft.

Measured well depth (Before) (TOIC): 229 ft.

Measured well depth (After)) (TOIC): 230 ft.

5. Inside diameter of well: 4. in.

6. Volume of water in filter pack and well casing: 5.9 gal.

7. Volume of water removed from well: 41. gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None . gal.

9. Source of water added: _____

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 17.98 ft.	17.65
Date:	b. 9 / 26 / 97 (mm dd yy)	9 / 26 / 97 (mm dd yy)
	■ a.m.	☐ a.m.
Time:	c. 11 : 59 ☐ p.m.	13 : 05 ■ p.m.
11 Sediment in well bottom:	. inches	. inches
12 Water Observations:	Clear ■ / Turbid ☐	Clear ■ / Turbid ☐
(Describe) Color	Clear	Clear
Odor		
Turbidity	None	None
HNu		

Filter Pack Vol. (gallons) $0.16(R^2 - r^2)ls$ = 2.8

Well casing Vol. (gallons) $0.16r^2 l$ = 3.1

Saturated length of sand pack (ft.) (ls): 1.5

Length of water column (ft.) (l): 4.9

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/l (AFTER)

Time	Gallons Purged	pH	Spec. Cond. (umhos/cm)	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb. (NTU)	DO (mg/L)	Comments
1211	5	6.70	465	11.88		Clear		4.1	1.93	
1215	10	6.64	453	11.83		Clear		2.5	1.23	
1221	15	6.64	455	12.37		Clear		4.0	1.72	
1231	20	6.66	449	11.72		Clear		63.2	1.42	
1239	25	6.69	445	11.28		Clear		30.2	1.02	
1247	30	6.75	440	12.23		Clear		29.8	0.78	
1255	35	6.64	442	12.04		Clear		19.9	0.84	
1304	41	6.65	439	11.64		Clear		19.6	1.17	

Notes: 1. Purged dry after 10 gal (recharges quickly); 2. DO = Dissolved Oxygen

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G121
Location: DuPage County | Project No.: 3920.0041
Developed By: DAP/ACC | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other: Surged with Pump	☐

3. Time spent developing well: 20 min.

4. Total well depth ~~(TOC)~~ (GS) (From well construction summary): 200.0 ft.

Measured well depth (Before): 206 ft.

Measured well depth (After): 208 ft.

5. Inside diameter of well: 4.00 in.

6. Volume of water in filter pack and well casing: 16.4 gal.

7. Volume of water removed from well: 110.0 gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None gal.

9. Source of water added: None

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 11.62 ft.	11.65 ft.
Date:	b. 10 / 23 / 96 (mm dd yy)	10 / 25 / 96 (mm dd yy)
Time:	☐ a.m. ■ p.m. c. 12 : 30	■ a.m. ☐ p.m. 11 : 00
11 Sediment in well bottom:	-- . -- inches	-- . -- inches
12 Water Observations:	Clear ☐ Turbid ■ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Black/Gray	Clear
Odor	Septic	Slight Septic
Turbidity	Turbid	None
HNu		

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 107

Well casing Vol. (gallons) $0.16r^2 l$ = 5.7

Saturated length of sand pack (ft.) (ls) = 9.0

Length of water column (ft.) (l) = 89.8

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

	(BEFORE)	(AFTER)
13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l	_____ mg/l

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Meter Turb.	D.O.	Comment
940	25	12.4	550	13.5		Lt. Gray	Septic	33.50	1.61	200 NTU for
945	40	12.4	545	13.7		Lt. Gray	Septic	18.80	1.64	Turbidity
948	70	12.5	545	13.8		Lt. Gray	Septic	8.90	1.69	200 NTU for
952	90	12.6	545	14.0		Clear	Sl. Septic	8.90	1.63	Turbidity
957	110	12.6	545	14.0		Clear	Sl. Septic	8.90	1.60	

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Forest Preserve | Well No.: G121
Location: Warrenville, IL | Project No.: 1252008.051602
Developed By: JMK, BPG | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other surged w/ pump periodically	☐

3. Time spent developing well: 46 min.

4. Total well depth (bgs): 20.0 ft.
(From well construction summary)

Measured well depth (Before) (TOIC): 21.2 ft.

Measured well depth (After)) (TOIC): 21.2 ft.

5. Inside diameter of well: 4. in.

6. Volume of water in filter pack and well casing: 11.4 gal.

7. Volume of water removed from well: 80. gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None . gal.

9. Source of water added: _____

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 11.81 ft.	11.8
Date:	b. 9 / 25 / 97 (mm dd yy)	9 / 25 / 9 (mm dd yy)
Time:	☐ a.m. c. 14 : 55 ■ p.m.	☐ a. 16 : 00 ■ p.
11 Sediment in well bottom:	. inches	. in
12 Water Observations:	Clear ☐ Turbid ■ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Gray	Clear
Odor		
Turbidity	Turbid	None
HNu		

Filter Pack Vol. (gallons) $0.16(R^2 - r^2)ls$ = 5.4

Well casing Vol. (gallons) $0.16r^2 l$ = 6.0

Saturated length of sand pack (ft.) (ls) 2.8

Length of water column (ft.) (l) 9.4

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	mg/l	m
14. COD (250 ml Unfiltered Sulfuric)	mg/l (BEFORE)	m (AFTER)

Time	Gallons Purged	pH	Spec. Cond. (umhos/cm)	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb. (NTU)	DO (mg/L)	Comments
1512	10	7.32	228	13.25		Lt. Gray		2.1	0.86	
1516	20	7.32	224	13.24		Clear		3.1	0.93	
1524	30	7.27	652	13.04		Clear		2.6	1.66	
1527	40	7.25	651	13.02		Clear		1.4	0.52	
1536	50	7.26	242	13.02		Clear		2.6	1.79	
1539	60	7.26	267	12.99		Clear		2.2	1.93	
1546	70	7.27	239	12.99		Clear		2.7	2.10	
1551	80	7.27	276	13.06		Clear		1.4	2.20	
Note: DO = Dissolved Oxygen										

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G122
Location: DuPage County | Project No.: 3920.0041
Developed By: DAP/ACC | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other	☐

3. Time spent developing well: 30 min.

4. Total well depth ~~(TOC)~~ (GS) (From well construction summary): 255.5 ft.

Measured well depth (Before): 256 ft.

Measured well depth (After): 256 ft.

5. Inside diameter of well: 4.00 in.

6. Volume of water in filter pack and well casing: 20.4 gal.

7. Volume of water removed from well: 1200.0 gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None gal.

9. Source of water added: None

		Before Development	After Development
10	Depth to Water (from top of well casing)	a. 14.44 ft.	14.40 ft
	Date:	b. 10 / 23 / 96 (mm dd yy)	10 / 28 / 96 (mm dd yy)
	Time:	■ a.m. c. 9 : 40 ☐ p.m.	■ a.m. 10 : 00 ☐ p.m.
11	Sediment in well bottom:	-- . -- inches	-- . -- inches
12	Water Observations:	Clear ■ Turbid ☐ (Describe)	Clear ■ Turbid ☐ (Describe)
	Color	Clear	Clear
	Odor	None	None
	Turbidity	Clear	Clear
	HNu	N/A	N/A

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 13.3

Well casing Vol. (gallons) $0.16r^2l$ = 7.1

Saturated length of sand pack (ft.) (ls): 11.2

Length of water column (ft.) (l): 1.1.2

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

		(BEFORE)	(AFTER)
13	Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l
14	COD (250 ml Unfiltered Sulfuric)	_____ mg/l	_____ mg/l

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Meter Turb.	D.O.	Comment
945	20	7.14	840	12.7		Clear	None	Clear	1.49	
950	40	6.90	840	13.2		Clear	None	Clear	1.28	
955	60	6.83	834	13.4		Clear	None	Clear	1.30	
1000	80	6.93	835	13.4		Clear	None	Clear	1.20	
1005	100	6.89	838	13.3		Clear	None	Clear	1.24	
1010	120	6.90	835	13.3		Clear	None	Clear	1.20	

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G123
Location: DuPage County | Project No.: 3920.0041
Developed By: DAP/ACC | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other	☐

3. Time spent developing well: 20 min.

4. Total well depth ~~(TOC)~~ (GS) (From well construction summary): 215 ft.

Measured well depth (Before): 220 ft.

Measured well depth (After): 220 ft.

5. Inside diameter of well: 4.00 in.

6. Volume of water in filter pack and well casing: 12.3 gal.

7. Volume of water removed from well: 85.0 gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None gal.

9. Source of water added: None

	Before Development	After Development
10 Depth to Water (from top of well casing) a.	15.30 ft.	15.30
Date: b.	10 / 25 / 96 (mm dd yy)	10 / 25 / 96 (mm dd yy)
Time: c.	8 : 00 ■ a.m. ☐ p.m.	9 : 05 ■ a.m. ☐ p.m.
11 Sediment in well bottom:	-- . -- inches	-- . -- inch
12 Water Observations:	Clear ■ Turbid ☐	Clear ■ Turbid ☐
(Describe)		
Color	Clear	Clear
Odor	None	None
Turbidity	Clear	Clear
HNu	N/A	N/A

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 8.0

Well casing Vol. (gallons) $0.16r^2l$ = 4.3

Saturated length of sand pack (ft.) (ls) 6.7

Length of water column (ft.) (l) 6.7

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	mg/l	mg/
14. COD (250 ml Unfiltered Sulfuric)	mg/l (BEFORE)	mg/ (AFTER)

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Meter Turb.	D.O.	Comme
845	25	9.66	566	13.7		Clear	None	11.36	2.80	200 NTU Sale
852	40	9.45	597	13.8		Clear	None	3.74	1.85	for Turbidity
855	55	9.42	600	14.0		Clear	None	2.60	2.03	
900	70	9.47	498	14.1		Clear	None	2.50	1.98	
905	85	9.51	601	14.0		Clear	None	2.20	2.12	

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G126
Location: DuPage County | Project No.: 3920.0041
Developed By: DAP/ACC | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other	☐

3. Time spent developing well: 15 min.

4. Total well depth ~~(TOC)~~ (GS): 17.7 ft.
(From well construction summary)

Measured well depth (Before): 19.3 ft.

Measured well depth (After): 19.3 ft.

5. Inside diameter of well: 4.00 in.

6. Volume of water in filter pack and well casing: 12.7 gal.

7. Volume of water removed from well: 70.0 gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None gal.

9. Source of water added: None

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 12.36 ft.	12.36 ft
Date:	b. 10 / 23 / 96 (mm dd yy)	10 / 28 / 96 (mm dd yy)
Time:	■ a.m. ☐ p.m. c. 11 : 30	■ a.m. ☐ p.m. 8 : 30
11 Sediment in well bottom:	-- . -- inches	-- . -- inches
12 Water Observations:	Clear ■ Turbid ☐ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Clear	Clear
Odor	None	None
Turbidity	Clear	Clear
HNu	N/A	N/A

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 8.3

Well casing Vol. (gallons) $0.16r^2l$ = 4.4

Saturated length of sand pack (ft.) (ls) 6.9

Length of water column (ft.) (l) 6.9

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/l (AFTER)

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Meter Turb.	D.O.	Comment
8:10	15	6.78	1360	13.0		Clear	None	Clear	1.62	
8:12	25	6.90	1140	14.0		Clear	None	Clear	1.47	
8:15	40	6.89	1110	14.1		Clear	None	Clear	1.43	
8:20	60	6.73	1110	14.2		Clear	None	Clear	1.48	
8:24	70	6.79	1120	19.0		Clear	None	Clear	1.48	

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G127
Location: DuPage County | Project No.: 3920.0041
Developed By: DAP/ACC | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other _____	☐

3. Time spent developing well: 24 min.

4. Total well depth ~~(TOC)~~ (GS): 190.0 ft.
(From well construction summary)

Measured well depth (Before): 209.0 ft.

Measured well depth (After): 209.0 ft.

5. Inside diameter of well: 4.00 in.

6. Volume of water in filter pack and well casing: 11.5 gal.

7. Volume of water removed from well: 70.0 gal.

Relative recovery rate _____ ft. per _____ min.

8. Volume of water added (if any): None gal.

9. Source of water added: None

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 14.60 ft.	14.60 ft
Date:	b. 10 / 23 / 96 (mm dd yy)	10 / 25 / 96 (mm dd yy)
Time:	c. 12 : 00 ■ a.m. ☐ p.m.	11 : 30 ■ a.m. ☐ p.m.
11 Sediment in well bottom:	-- . -- inches	-- . -- inches
12 Water Observations:	Clear ■ Turbid ☐ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Clear	Clear
Odor	None	None
Turbidity	Clear	Clear
HNu	N/A	N/A

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 7.5

Well casing Vol. (gallons) $0.16r^2l$ = 4.0

Saturated length of sand pack (ft.) (ls) 6.3

Length of water column (ft.) (l) 6.3

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/l (AFTER)

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Meter Turb.	D.O.	Comm
11:00	10	Not Working		13.4		Clear/Lt Yellow	None	24.0	1.80	200 NTU Sale
11:04	20	Not Working		13.4		Clear/Lt Yellow	None	7.4	1.86	for Turbidity
11:08	30	Not Working		13.1		Clear/Lt Yellow	None	8.0	1.80	
11:12	40	Not Working		13.1		Clear	None	6.2	1.80	
11:16	50	Not Working		13.1		Clear	None	3.2	1.65	
11:20	60	Not Working		13.1		Clear	None	2.8	1.65	
11:24	70	Not Working		13.1		Clear	None	2.8	1.60	

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Forest Preserve | Well No.: G127
Location: Warrenville, IL | Project No.: 1252008.051602
Developed By: JMK, BPG | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other surged w/ pump periodically	☐

3. Time spent developing well: 57 min.

4. Total well depth (bgs): 190.0 ft.
(From well construction summary)

Measured well depth (Before) (TOIC): 211.1 ft.

Measured well depth (After)) (TOIC): 210 ft.

5. Inside diameter of well: 4. in.

6. Volume of water in filter pack and well casing: 8.3 gal.

7. Volume of water removed from well: 59. gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None . gal.

9. Source of water added: _____

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 14.35 ft.	14.32
Date:	b. 9 / 25 / 97 (mm dd yy) ☐ a.m.	9 / 25 / 97 ☐ a.m.
Time:	c. 12 : 33 ■ p.m.	13 : 59 ■ p.m.
11 Sediment in well bottom:	. inches	. inch
12 Water Observations:	Clear ☐ Turbid ■ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Lt Yellow/Tan	Clear
Odor		
Turbidity	Turbid	None
HNu		

Filter Pack Vol. (gallons) $0.16(R^2 - r^2)ls$ = 3.9

Well casing Vol. (gallons) $0.16r^2 l$ = 4.4

Saturated length of sand pack (ft.) (ls): 2.0

Length of water column (ft.) (l): 6.8

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

	(BEFORE)	(AFTER)
13 Total suspended solids (500 ml Unfiltered)	mg/l	mg/l
14. COD (250 ml Unfiltered Sulfuric)	mg/l	mg/l

Time	Gallons Purged	pH	Spec. Cond. (umhos/cm)	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb. (NTU)	DO (mg/L)	Comments
1307	4	6.97	336	12.94		Lig Yellow/Tan		14.7	0.09	
1317	6	6.94	914	12.92		Clear		14.0	1.31	
1314	9	6.91	922	12.40		Clear		6.9	0.79	
1318	14	6.92	920	13.39		Clear		0.0	0.64	
1325	19	6.92	920	12.58		Clear		3.4	0.50	
1328	24	6.89	894	12.61		Clear		12.4	0.55	
1332	29	6.91	895			Clear		5.6	0.49	
1337	34	6.91	873	12.55		Clear		4.6	0.43	
1342	39	6.90	328	12.36		Clear		8.8	0.42	
1345	44	6.91	328	12.38		Clear		3.4	0.39	
1347	49	6.91	351	12.01		Clear		3.9	0.32	
1351	54	6.91	348	11.98		Clear		2.9	0.30	
1359	59		332	11.97		Clear		3.2	0.29	

Note: DO = Dissolved Oxygen

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MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G128D
Location: DuPage County | Project No.: 3920.0041
Developed By: DAP/ACC | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other	☐

3. Time spent developing well: 70 min.

4. Total well depth ~~(TOC)~~ (GS) (From well construction summary): 545 ft.

Measured well depth (Before): 564 ft.

Measured well depth (After): 564 ft.

5. Inside diameter of well: 4.00 in.

6. Volume of water in filter pack and well casing: 40.6 gal.

7. Volume of water removed from well: 240.0 gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None gal.

9. Source of water added: None

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 15.49 ft.	15.49 ft.
Date:	b. 10 / 23 / 96 (mm dd yy)	10 / 24 / 96 (mm dd yy)
Time:	■ a.m. c. 10 : 00 ☐ p.m.	☐ a.m. 4 : 00 ■ p.m.
11 Sediment in well bottom:	-- . -- inches	-- . -- inches
12 Water Observations:	Clear ■ Turbid ☐ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Clear White	Clear Light Gray
Odor	None	None
Turbidity	Cloudy	Clear
HNu	N/A	N/A

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 44

Well casing Vol. (gallons) $0.16r^2l$ = 26.2

Saturated length of sand pack (ft.) (ls) 12.0

Length of water column (ft.) (l) 40.9

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/l (AFTER)

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Meter Turb.	D.O.	Comm
14:58	40	7.71	698	12.7		White Cloudy	None	159.5	2.10	200 NTU Sale
15:10	80	7.60	740	12.8		White Cloudy	None	128.6	2.10	for Turbidity
15:22	120	8.40	735	12.4		Clear Lt. Gray	None	37.5	2.06	
15:34	160	8.70	727	12.4		Clear Lt. Gray	None	25.4	2.05	
15:46	200	8.76	725	12.4		Clear Lt. Gray	None	12.0	2.07	
16:00	240	8.76	730	12.4		Clear Lt. Gray	None	10.1	2.04	

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G129
Location: DuPage County | Project No.: 3920.0041
Developed By: DAP/ACC | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other	☐

3. Time spent developing well: 30 min.

4. Total well depth ~~(TOC)~~ (GS): 175 ft.
(From well construction summary)

Measured well depth (Before): 192 ft.

Measured well depth (After): 192 ft.

5. Inside diameter of well: 4.00 in.

6. Volume of water in filter pack and well casing: 18.4 gal.

7. Volume of water removed from well: 120.0 gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None gal.

9. Source of water added: None

	Before Development	After Development
10 Depth to Water (from top of well casing) a.	9.90 ft.	9.90 ft.
Date: b.	10 / 23 / 96 (mm dd yy)	10 / 29 / 96 (mm dd yy)
Time: c.	2 : 00 ☐ a.m. ■ p.m.	10 : 00 ☐ a.m. ■ p.m.
11 Sediment in well bottom:	-- . -- inches	-- . -- inches
12 Water Observations:	Clear ☐ Turbid ☐ (Describe)	Clear ☐ Turbid ☐ (Describe)
Color	Rusty	Slight Rust
Odor	Musty	None
Turbidity		Clear
HNu	N/A	N/A

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 120

Well casing Vol. (gallons) $0.16r^2l$ = 6.4

Saturated length of sand pack (ft.) (ls): 10.2

Length of water column (ft.) (l): 10.2

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/l (AFTER)

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Meter Turb.	D.O.	Comment
9:40	20	8.90	800	12.2		Rust	Musty	To High to Read	3.40	200 NTU Sale
9:45	40	8.40	800	12.1		Rust	Musty		3.35	for Turbidity
9:50	60	7.79	805	12.3		Sl. Rust	None	104.0	2.89	
9:55	80	7.52	800	12.3		Sl. Rust	None	75.0	2.86	
10:00	100	7.36	800	12.3		Sl. Rust	None	60.0	2.86	
10:50	120	7.35	800	12.3		Sl. Rust	None	56.0	2.86	

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Forest Preserve | Well No.: G130
Location: Warrenville, IL | Project No.: 1252008.051602
Developed By: JMK, BPG | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other surged w/ pump periodically	☐

3. Time spent developing well: 28 min.

4. Total well depth (bgs) (From well construction summary): 23.0 ft.

Measured well depth (Before) (TOIC): 24.4 ft.

Measured well depth (After)) (TOIC): 24.4 ft.

5. Inside diameter of well: 4. in.

6. Volume of water in filter pack and well casing: 8.7 gal.

7. Volume of water removed from well: 62. gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None . gal.

9. Source of water added: _____

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 16.95 ft.	16.96
Date:	b. 9 / 26 / 97 (mm dd yy)	9 / 26 / 97 (mm dd yy)
Time:	c. 10 : 21 ■ a.m. ☐ p.m.	11 : 12 ■ a.m ☐ p.m
11 Sediment in well bottom:	. inches	. inch
12 Water Observations:	Clear ☐ Turbid ■ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Lt Gray	Clear
Odor		
Turbidity	Turbid	None
HNu		

Filter Pack Vol. (gallons) $0.16(R^2 - r^2)ls$ = 4.0

Well casing Vol. (gallons) $0.16r^2 l$ = 4.7

Saturated length of sand pack (ft.) (ls): 2.2

Length of water column (ft.) (l): 7.4

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/ (AFTER)

Time	Gallons Purged	pH	Spec. Cond. (umhos/cm)	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb. (NTU)	DO (mg/L)	Comments
1042	10	6.86	1477	9.97		Cloudy/Gray		51.0	0.68	
1045	20	6.85	1473	9.97		Clear		13.7	0.65	
1050	30	6.85	674	10.06		Clear		11.6	0.76	
1055	40	6.86	603	10.03		Clear		3.8	0.71	
1100	50	6.86	519	10.10		Clear		10.6	1.22	
1102	55	6.86	505			Clear		4.8	1.16	
1105	62	6.86	517	10.06		Clear		2.1	1.12	

Note: DO = Dissolved Oxygen

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G131D
Location: Warrenville | Project No.: 1252008.052
Developed By: JMK/BPG | Checked By:

1. Can this well be purged dry? ■ Yes ☐ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other	☐

3. Time spent developing well: 18 min.

Total well depth (TOIC) (From well construction summary): 541 ft.

Measured well depth (Before) (TOIC): ___ ft.

Measured well depth (After) (TOIC): ___ ft.

5. Inside diameter of well: 4 in.

6. Volume of water in filter pack and well casing: 25.1 gal.

7. Volume of water removed from well: 35 gal.

Relative recovery rate: 0.5 ft. per. 6 min.

8. Volume of water added (if any): None gal.

9. Source of water added: None

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 14.94 ft.	47.50
Date:	b. 11 / 4 / 97 (mm dd yy) ☐ a.m.	11 / 4 / 97 (mm dd yy) ☐ a.m.
Time:	c. 13 : 20 ■ p.m.	13 : 59 ■ p.m.
11 Sediment in well bottom:	___ inches	___ inch
12 Water Observations:	Clear ■ Turbid ☐ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Clear	C;ear
Odor		
Turbidity	None	None
HNu		

Filter Pack Vol. (gallons) $0.16(R^2 - r^2)ls$ = None

Well casing Vol. (gallons) $0.16r^2l$ = 25.1

Saturated length of sand pack (ft.) (ls): None

Length of water column (ft.) (l): 39.2

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

	(BEFORE)	(AFTER)
13 Total suspended solids (500 ml Unfiltered)	___ mg/l	___ mg/
14. COD (250 ml Unfiltered Sulfuric)	___ mg/l	___ mg/

Time	Gallons Purged	pH	Spec. Cond. (umhos/cm)	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb. (NTU)	DO (mg/L)	Comment
13:50	10	12.41	560	11.29		Clear		96.6	0.93	
13:52	20	12.46	650	11.47		Clear		>100	0.58	
13:55	25	12.41	999	11.93		Clear		95.6	0.47	
13:57	30	12.28	1493	12.33		Clear		48.1	0.78	

Note: DO = Dissolved Oxygen

- Purged dry after 35 gallons

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MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G133S
Location: DuPage County | Project No.: 3920.0041
Developed By: DAP/ACC | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other	☐

3. Time spent developing well: 150 min.

4. Total well depth ~~(TOC)~~ (GS): 210.0 ft.
(From well construction summary)

Measured well depth (Before): 230 ft.

Measured well depth (After): 230 ft.

5. Inside diameter of well: 4.00 in.

6. Volume of water in filter pack and well casing: 13.3 gal.

7. Volume of water removed from well: 75.0 gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None gal.

9. Source of water added: None

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 15.74 ft.	15.74 ft
Date:	b. 10 / 23 / 96 (mm dd yy)	10 / 28 / 96 (mm dd yy)
Time:	■ a.m. ☐ p.m. c. 9 : 45	☐ a.m. ■ p.m. 2 : 30
11 Sediment in well bottom:	-- . -- inches	-- . -- inche
12 Water Observations:	Clear ☐ Turbid ☐ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Lt Gray Brown	Clear
Odor	None	None
Turbidity	Moderate	None
HNu	N/A	N/A

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 8.7

Well casing Vol. (gallons) $0.16r^2l$ = 4.6

Saturated length of sand pack (ft.) (ls) 7.26

Length of water column (ft.) (l) 7.26

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/l (AFTER)

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Meter Turb.	D.O.	Comm
13:30	15	7.53	1050	13.2		Lt Gray Brown	None	Mod. Turb	1.7	
13:33	30	7.22	1070	13.0		Clear Gray	None	Low Turb.	1.74	
13:36	40	7.13	1075	13.0		Clear Gray	None	Low Turb.	1.57	
13:39	60	7.25	1072	13.0		Clear Gray	None	Week to Cle	1.55	
13:42	75	7.10	1080	12.9		Clear	None	Week to Cle	1.50	

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MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G133D
Location: DuPage County | Project No.: 3920.0041
Developed By: DAP/ACC | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other: Surged with Pump	■

3. Time spent developing well: 600 min.

4. Total well depth ~~(TOC)~~ (GS): 530.0 ft.
(From well construction summary)

Measured well depth (Before): 540.0 ft.

Measured well depth (After): 541.1 ft.

5. Inside diameter of well: 4.00 in.

6. Volume of water in filter pack and well casing: 385 gal.

7. Volume of water removed from well: 2100.0 gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None gal.

9. Source of water added: None

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 16.20 ft.	16.20 ft.
Date:	b. 10 / 23 / 96 (mm dd yy)	10 / 28 / 96 (mm dd yy)
Time:	■ a.m. ☐ p.m. c. 9 : 40	☐ a.m. ■ p.m. 2 : 50
11 Sediment in well bottom:	1.2 inches	0. inches
12 Water Observations:	Clear ☐ Turbid ☐ (Describe)	Clear ☐ Turbid ☐ (Describe)
Color	White/Gray	Clear
Odor	None	None
Turbidity	Turbid	None
HNu	N/A	N/A

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 143

Well casing Vol. (gallons) $0.16r^2l$ = 242

Saturated length of sand pack (ft.) (ls) 120

Length of water column (ft.) (l) 378

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

	(BEFORE)	(AFTER)
13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l	_____ mg/l

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb.	D.O.	Comment
14:00	40	--	--	--		Gray	None	Turbid		
14:10	80	7.68	875	13.0		Clear	None	Clear	0.86	
14:20	120	7.10	888	12.3		Clear	None	Clear	0.78	
14:30	160	7.10	875	12.2		Clear	None	Clear	0.77	
14:40	190	7.00	875	12.0		Clear	None	Clear	0.70	
14:50	210	7.00	875	12.0		Clear	None	Clear	0.70	

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Forest Preserve | Well No.: G135
Location: Warrenville, IL | Project No.: 1252008.051602
Developed By: JMK, BPG | Checked By:

1. Can this well be purged dry? ■ Yes ☐ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other: surged w/ pump periodically	☐

3. Time spent developing well: 87 min.

4. Total well depth (bgs) (From well construction summary): 82.0 ft.

Measured well depth (Before) (TOIC): 84.2 ft.

Measured well depth (After)) (TOIC): ___ ft.

5. Inside diameter of well: 4 in.

6. Volume of water in filter pack and well casing: 42.5 gal.

7. Volume of water removed from well: 65.0 gal.

Relative recovery rate: 1.3 ft. per. 1 min.

8. Volume of water added (if any): None gal.

9. Source of water added:

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 28.30 ft.	72.25
Date:	b. 9 / 24 / 97 (mm dd yy)	9 / 24 / 97 (mm dd yy)
Time:	☐ a.m. c. 12 : 02 ■ p.m.	☐ a.m. 15 : 18 ■ p.m
11 Sediment in well bottom:	___ inches	___ inch
12 Water Observations:	Clear ☐ Turbid ■	Clear ■ Turbid ☐
(Describe) Color	Dark Gray	Clear
Odor		
Turbidity	Turbid	None
HNu		

Filter Pack Vol. (gallons) $0.16(R^2 - r^2)ls$ = 69

Well casing Vol. (gallons) $0.16r^2 l$ = 35.6

Saturated length of sand pack (ft.) (ls): 3.6

Length of water column (ft.) (l): 55.6

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	___ mg/l	___ mg
14. COD (250 ml Unfiltered Sulfuric)	___ mg/l (BEFORE)	___ mg (AFTER)

Time	Gallons Purged	pH	Spec. Cond. (umhos/cm)	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb. (NTU)	DO (mg/L)	Comments
1359	20	12.00	2312	10.91		Lt Gray		34.6	4.08	
1413	40	8.85	592	11.54		Clear		208.0	4.29	
1444	50	7.94	618	11.64		Clear		13.1	0.18	
1455	55	7.98	596	11.65		Clear		9.5	0.20	
1500	57	8.00	622	11.71		Clear		11.8	0.19	
1509	61	7.93	618	11.75		Clear		10.0	0.13	
1513	63	7.95	619	11.82		Clear		4.7	0.06	
1515	65	8.04	618	11.89		Clear		4.3	0.11	

Notes: 1. Purged Dry After 40 gal.; 2. DO = Dissolved Oxygen

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G138
Location: DuPage County | Project No.: 3920.0041
Developed By: DAP/ACC | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other	☐

3. Time spent developing well: 35 min.

4. Total well depth ~~(TOC)~~ (GS) (From well construction summary): 540.0 ft.

Measured well depth (Before): 562 ft.

Measured well depth (After): 562 ft.

5. Inside diameter of well: 4.00 in.

6. Volume of water in filter pack and well casing: 39.5 gal.

7. Volume of water removed from well: 175.0 gal.

Relative recovery rate: _____ ft. per. _____

8. Volume of water added (if any): ___.__ gal.

9. Source of water added: _____

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 16.83 ft.	16.80 ft
Date:	b. 10 / 23 / 96 (mm dd yy)	10 / 29 / 96 (mm dd yy)
Time:	c. ___ : ___ ☐ a.m. ☐ p.m.	___ : ___ ☐ a.m. ☐ p.m.
11 Sediment in well bottom:	___.__ inches	___.__ inche
12 Water Observations:	Clear ☐ Turbid ☐ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Sl. Cloudy	Clear
Odor	None	None
Turbidity	Cloudy	Clear
HNu	N/A	N/A

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 14.3

Well casing Vol. (gallons) $0.16r^2l$ = 25.2

Saturated length of sand pack (ft.) (ls) 12.0

Length of water column (ft.) (l) 39.4

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/l (AFTER)

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Meter Turb.	D.O.	Comment
11:32	35	7.45	1015	11.6		Sl. Cloudy	None	43.50	3.43	200 NTU Scale
11:40	70	7.08	1033	11.4		Clear	None	8.57	3.11	201 NTU Scale
11:48	105	7.10	1039	11.2		Clear	None	3.92	2.91	202 NTU Scale
11:56	140	7.05	1026	11.2		Clear	None	2.65	2.62	203 NTU Scale
12:04	175	7.05	1025	11.2		Clear	None	2.46	2.60	204 NTU Scale

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G139
Location: DuPage County | Project No.: 3920.0041
Developed By: DAP/ACC | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other _____	☐

3. Time spent developing well: 50 min.

4. Total well depth ~~(TOC)~~ (GS) (From well construction summary): 55.5 ft.

Measured well depth (Before): 57.5 ft.

Measured well depth (After): 57.5 ft.

5. Inside diameter of well: 4.00 in.

6. Volume of water in filter pack and well casing: 44.6 gal.

7. Volume of water removed from well: 225.0 gal.

Relative recovery rate _____ ft. per. _____

8. Volume of water added (if any): ___.__ gal.

9. Source of water added: _____

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 10.15 ft.	10.10
Date:	b. 10 / 23 / 96 (mm dd yy)	10 / 29 / 96 (mm dd yy)
Time:	☐ a.m. c. 2 : 00 ■ p.m.	■ a.m. 10 : 30 ☐ p.m
11 Sediment in well bottom:	___.__ inches	___.__ inch
12 Water Observations:	Clear ■ Turbid ☐ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Clear	Clear
Odor	None	None
Turbidity	None	Clear
HNu	N/A	N/A

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 14.3

Well casing Vol. (gallons) $0.16r^2l$ = 30.3

Saturated length of sand pack (ft.) (ls) 12.0

Length of water column (ft.) (l) 47.4

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/ (AFTER)

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Meter Turb.	D.O.	Comme
10:40	45	7.68	710	11.3		Clear	None	22.50	5.96	200 NTU Scal
10:50	90	7.70	725	10.9		Clear	None	16.00	4.84	201 NTU Scal
11:00	135	7.62	722	10.8		Clear	None	6.70	4.60	202 NTU Scal
11:10	180	7.62	715	10.8		Clear	None	4.38	4.42	203 NTU Scal
11:20	200	7.55	717	10.8		Clear	None	3.98	4.40	204 NTU Scal

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G140D
Location: DuPage County | Project No.: 3920.0041
Developed By: DAP/ACC | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other _____	☐

3. Time spent developing well: 15 min.

4. Total well depth ~~(TOC)~~ (GS) (From well construction summary): ___.__ ft.

Measured well depth (Before): 607.7 ft.

Measured well depth (After): 607.7 ft.

5. Inside diameter of well: 2.00 in.

6. Volume of water in filter pack and well casing: 11.0 gal.

7. Volume of water removed from well: 60.0 gal.

Relative recovery rate _____ ft. per. _____

8. Volume of water added (if any): ___.__ gal.

9. Source of water added: _____

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 13.66 ft.	13.61 ft.
Date:	b. 10 / 25 / 96 (mm dd yy)	10 / 28 / 96 (mm dd yy)
Time:	c. 11 : 30 ☐ a.m. ■ p.m.	9 : 30 ☐ a.m. ■ p.m.
11 Sediment in well bottom:	___.__ inches	___.__ inches
12 Water Observations:	Clear ☐ Turbid ☐ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Cloudy White	Clear
Odor	None	None
Turbidity	Turbid	Clear
HNu	N/A	N/A

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 3.2

Well casing Vol. (gallons) $0.16r^2l$ = 7.7

Saturated length of sand pack (ft.) (ls) = 7.0

Length of water column (ft.) (l) = 47.1

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/l (AFTER)

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Meter Turb.	D.O.	Comment
9:05	10	7.02	960	11.1		White/Yellow	None	Clear	1.14	Turb. meter
9:07	20	7.06	950	11.1		SL Cloudy White	None	Clear	1.15	charge ran out
9:10	30	7.00	950	11.1		Clear	None	Clear	1.20	
9:12	40	6.99	950	11.1		Clear	None	Clear	1.26	
9:15	50	6.90	950	11.1		Clear	None	Clear	1.24	
9:20	60	6.95	950	11.1		Clear	None	Clear	1.20	

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G141D
Location: DuPage County | Project No.: 3920.0041
Developed By: DAP/ACC | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only	☐
pumped only	■
pumped slowly	☐
Other _____	☐

3. Time spent developing well: 34 min.

4. Total well depth ~~(TOC)~~ (GS) (From well construction summary): ___.__ ft.

Measured well depth (Before): 638 ft.

Measured well depth (After): 638 ft.

5. Inside diameter of well: 2.00 in.

6. Volume of water in filter pack and well casing: 16.0 gal.

7. Volume of water removed from well: 85.0 gal.

Relative recovery rate _____ ft. per. _____

8. Volume of water added (if any): ___.__ gal.

9. Source of water added: _____

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 16.41 ft.	16.40 ft
Date:	b. 10 / 24 / 96 (mm dd yy)	10 / 24 / 96 (mm dd yy)
Time:	☐ a.m. c. 1 : 00 ■ p.m.	☐ a.m. 2 : 00 ■ p.m.
11 Sediment in well bottom:	___.__ inches	___.__ inches
12 Water Observations:	Clear ■ Turbid ☐ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Clear	Clear
Odor	None	None
Turbidity	Clear	Clear
HNu	N/A	N/A

Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = 8.2

Well casing Vol. (gallons) $0.16r^2l$ = 7.7

Saturated length of sand pack (ft.) (ls) 12.0

Length of water column (ft.) (l) 47.3

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/l (AFTER)

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Meter Turb.	D.O.	Comme
1:22	20	7.50	680	12.5		Clear	None	1.48	1.20	
1:31	40	8.14	697	12.8		Clear	None	0.51	1.15	
1:37	55	8.26	692	12.5		Clear	None	0.44	1.10	
1:43	70	8.40	686	12.2		Clear	None	0.28	1.09	
1:49	85	8.44	684	12.2		Clear	None	0.19	1.14	

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G142
Location: Warrenville | Project No.: 152008.051602
Developed By: JMK/BPG | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed for 30 minutes	■
pumped	■
pumped slowly	☐
Other surged w/ pump periodically	■

3. Time spent developing well by pumping: 28 min.

4. Total well depth (TOIC) (From well construction summary): 235 ft.

Measured well depth (Before) (TOIC): 234 ft.

Measured well depth (After) (TOIC): ___ ft.

5. Inside diameter of well: 2 in.

6. Volume of water in filter pack and well casing: 5.9 gal.

7. Volume of water removed from well: 65 gal.

Relative recovery rate: ____ ft. per. ____ min.

8. Volume of water added (if any): None gal.

9. Source of water added: None

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 16.85 ft.	16.85 ft.
Date:	b. 11 / 7 / 97 (mm dd yy)	11 / 7 / 97 (mm dd yy)
Time:	☐ a.m. c. 12 : 15 ■ p.m.	☐ a.m. 13 : 55 ■ p.m.
11 Sediment in well bottom:	___ inches	___ inches
12 Water Observations:	Clear ☐ Turbid ■ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Reddish-Brown	Clear
Odor		
Turbidity	Turbid	None
HNu		

Filter Pack Vol. (gallons) $0.16(R^2 - r^2)ls$ = 4.8

Well casing Vol. (gallons) $0.16r^2l$ = 1.1

Saturated length of sand pack (ft.) (ls): 2.0

Length of water column (ft.) (l): 6.6

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

	(BEFORE)	(AFTER)
13 Total suspended solids (500 ml Unfiltered)	____ mg/l	____ mg/l
14. COD (250 ml Unfiltered Sulfuric)	____ mg/l	____ mg/l

Time	Gallons Purged	pH	Spec. Cond. (umhos/cm)	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb. (NTU)	DO (mg/L)	Comment
1324	5	7.22	157	11.77		brown		>1000	5.67	
1327	10	7.19	152	11.79		lt. brown		>1000	5.27	
1330	15	7.18	215	11.79		lt. brown		808	4.91	
1333	20	7.21	423	11.79		clear		138	4.67	surge
1335	25	7.20	681	11.81		brown		>1000	5.06	
1337	30	7.20	809	11.78		lt brown		>1000	4.53	
1338	35	7.20	1007	11.78		lt brown		909	4.39	
1340	40	7.20	995	11.79		lt brown		305	4.30	surge
1342	45	7.19	1053	11.79		brown		>1000	4.26	
1345	50	7.19	1052	11.77		lt brown		845	4.18	
1346	55	7.19	1060	11.77		lt brown		267	4.16	
1348	60	7.19	1066	11.77		clear		76.0	4.12	
1350	65	7.18	1068	11.77		clear		50.7	4.10	

Note: DO = Dissolved Oxygen

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MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Forest Preserve | Well No.: G143
Location: Warrenville, IL | Project No.: 1252008.051602
Developed By: JMK, BPG | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed for 30 minutes	■
pumped	■
pumped slowly	☐
Other: surged w/ pump periodically	■

3. Time spent developing well by pumping: 28 min.

4. Total well depth (bgs) (From well construction summary): 20.0 ft.

Measured well depth (Before) (TOIC): 22.0 ft.

Measured well depth (After)) (TOIC): 21.4 ft.

5. Inside diameter of well: 2. in.

6. Volume of water in filter pack and well casing: 6.8 gal.

7. Volume of water removed from well: 180. gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None gal.

9. Source of water added: _____

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 14.19 ft.	____.__
Date:	b. 10 / 3 / 97 (mm dd yy)	/ / (mm dd yy)
Time:	■ a.m. c. 8 : 33 ☐ p.m.	☐ a.m ☐ p.m
11 Sediment in well bottom:	____.__ inches	____.__ inch
12 Water Observations:	Clear ☐ Turbid ■ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Dark Gray	Clear
Odor	None	
Turbidity	Turbid	None
HNu		

Filter Pack Vol. (gallons) $0.16(R^2 - r^2)ls$ = 5.6

Well casing Vol. (gallons) $0.16r^2 l$ = 1.2

Saturated length of sand pack (ft.) (ls) = 2.3

Length of water column (ft.) (l) = 7.8

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg (AFTER)

Time	Gallons Purged	pH	Spec. Cond. (umhos/cm)	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb. (NTU)	DO (mg/L)	Comme
1002	10	6.95	14	14.67		Dk Brown		312	1.06	
1010	20	6.88	14	14.55		Slightly Cloudy		251	0.38	
1013	23	7.17	15	13.79		Dk Brown		46.5	0.63	
1016	26	7.17	14	14.75		Lt. Brown		128	0.39	
1019	30	7.17	14	14.45		Slightly Cloudy		256	0.31	
1022	33	7.35	17	14.59		Dk Brown		30.5	0.76	
1024	36	7.18	16	14.35		Brown		68.3	0.45	
1027	39	7.34	17	14.00		Dk Brown		35.6	0.98	
1030	42	7.10	16	13.90		Lt. Brown		179	0.43	

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Time	Gallons Purged	pH	Spec. Cond. (umhos/cm)	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb. (NTU)	DO (mg/L)	Comments
1033	45	7.10	16	13.12		Dk Brown		58.6	0.74	
1035	48	7.04	15	13.09		Md Brown		105	0.42	
1039	51	7.05	14	14.52		Lt Brown		13.5	0.55	
1043	54	7.06	13	15.29		Lt Brown		13.1	0.51	
1048	57	7.08	13	16.30		Lt Brown		11.1	0.30	
1053	60	7.09	13	16.38		Clear		11.1	0.24	
1100	70	6.98	387	12.72		Cloudy		147	0.00	
1103	80	6.97	387	12.70		Brown/Tan		235	0.08	
1108	90	6.96	388	12.67		Brown/Tan		226	0.03	
1114	100	6.97	389	12.75		Brown/Tan		177	0.03	
1352	110	7.00	393	12.74		Clear		45.5	0.50	
1355	120	6.97	391	12.73		Clear		15.8	0.23	
1359	130	6.94	391	12.70		Dk Brown		342	0.12	
1403	140	6.93	389	12.68		Cloudy/Clear		74.0	0.04	
1406	150	6.93	39	12.66		Clear		15.1	0.00	
1410	160	6.93	392	12.64		Brown/Tan		344.0	0.07	
1413	170	6.92	390	12.64		Cloudy/Clear		65.2	0.00	
1416	180	6.92	391	12.63		Clear		23.8	0.00	

Note: DO = Dissolved Oxygen

MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G144
Location: Warrenville | Project No.: 1252008.051602
Developed By: JMK/BPG | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed for 30 minutes	■
pumped	■
pumped slowly	☐
Other: surged w/ pump periodically	■

3. Time spent developing well by pumping: 35 min.

4. Total well depth (TOIC) (From well construction summary): 195.5 ft.

Measured well depth (Before) (TOIC): 195.5 ft.

Measured well depth (After) (TOIC): ___ ft.

5. Inside diameter of well: 2. in.

6. Volume of water in filter pack and well casing: 9.9 gal.

7. Volume of water removed from well: 120. gal.

Relative recovery rate: ___ ft. per. ___ min.

8. Volume of water added (if any): None gal.

9. Source of water added: None

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 8.18 ft.	8.18
Date:	b. 11 / 5 / 97 (mm dd yy) ■ a.m.	11 / 5 / 97 ■ a.m.
Time:	c. 8 : 16 ☐ p.m.	9 : 50 ☐ p.m.
11 Sediment in well bottom:	-- . inches	-- . inches
12 Water Observations:	Clear ☐ Turbid ■ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Dark Brown	Clear
Odor		
Turbidity	Very Turbid	None
HNu		

Filter Pack Vol. (gallons) $0.16(R^2 - r^2)ls$ = 8.1

Well casing Vol. (gallons) $0.16r^2l$ = 1.8

Saturated length of sand pack (ft.) (ls) = 3.4

Length of water column (ft.) (l) = 11.3

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered): ___ mg/l (BEFORE) ___ mg/l (AFTER)

14. COD (250 ml Unfiltered Sulfuric): ___ mg/l (BEFORE) ___ mg/l (AFTER)

Time	Gallons Purged	pH	Spec. Cond. (umhos/cm)	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb. (NTU)	DO (mg/L)	Comm
914	10	7.13	1067	12.25		Lt brown		244	0.44	
916	20	7.12	1080	12.32		Lt brown		339	0.34	surge w/ pun
920	30	7.11	984	12.31		Dk brown		150	0.27	
922	40	7.11	1119	12.40		Lt brown		340	0.26	surge w/ pun
926	50	7.11	1026	12.34		brown		118	0.24	
929	60	7.11	1077	12.36		Lt brown		345	0.20	surge w/ pun
933	70	7.11	1113	12.36		brown		337	0.19	
935	80	7.11	1107	12.37		Lt brown		341	0.18	surge w/ pun
*938	90	7.11	112	12.31		Dk brown		6.0	0.17	
940	100	7.10	1116	12.37		Lt brown		326	0.17	surge w/ pun
943	110	7.10	978	12.49		brown		6.9	0.16	*
945	120	7.10	1068	12.36		Lt brown		241	0.16	

Note: DO = Dissolved Oxygen

* = Reading recorded right after surging. Specific conductivity not stable as a result.

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MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Landfill | Well No.: G145
Location: Warrenville | Project No.: 1252008.051602
Developed By: JMK/BPG | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed for 30 minutes	■
pumped	■
pumped slowly	☐
Other: surged w/ pump periodically	■

3. Time spent developing well by pumping: 21 min.

4. Total well depth (TOIC): 695 ft.
(From well construction summary)

Measured well depth (Before) (TOIC): 689 ft.

Measured well depth (After) (TOIC): 688 ft.

5. Inside diameter of well: 2 in.

6. Volume of water in filter pack and well casing: 9.6 gal.

7. Volume of water removed from well: 100 gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None gal.

9. Source of water added: None

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 19.65 ft.	19.67 ft.
Date:	b. 11 / 6 / 97 (mm dd yy) ■ a.m.	11 / 6 / 97 (mm dd yy) ■ a.m.
Time:	c. 8 : 25 ☐ p.m.	10 : 45 ☐ p.m.
11 Sediment in well bottom:	-.- inches	-.- inches
12 Water Observations:	Clear ☐ Turbid ■ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Brown	Clear
Odor		
Turbidity	Turbid	None
HNu		

Filter Pack Vol. (gallons) $0.16(R^2 - r^2)ls$ = 1.7

Well casing Vol. (gallons) $0.16r^2l$ = 7.9

Saturated length of sand pack (ft.) (ls): 4.0

Length of water column (ft.) (l): 49.3

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/l (AFTER)

Time	Gallons Purged	pH	Spec. Cond. (umhos/cm)	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb. (NTU)	DO (mg/L)	Comment
957	10	7.19	294	10.11		Lt brown		601	0.97	
1002	20	7.17	473	10.14		Clear		228	0.41	surge
1005	30	7.17	505	10.17		Lt brown		595	0.34	
1009	40	7.16	504	10.16		Clear		94.2	0.25	surge
1013	50	7.16	515	10.14		Clear		37.1	0.22	
1016	60	7.16	498	10.15		Clear		17.2	0.21	surge
1022	70	7.16	56	10.15		Clear		16.6	0.18	
1026	80	7.16	594	10.18		Clear		192	0.18	
1030	90	7.16	625	10.15		Clear		20.2	0.15	
1032	95	7.16	602	10.16		Clear		8.3	0.15	
1034	100	7.16	605	10.16		Clear		6.1	0.15	
Note: DO = Dissolved Oxygen										

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MONTGOMERY WATSON

MONITORING WELL DEVELOPMENT SUMMARY

Project Name: Blackwell Forest Preserve | Well No.: G146
Location: Warrenville, IL | Project No.: 1252008.051602
Developed By: JMK, BPG | Checked By:

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method

surged with bailer and bailed	☐
surged with bailer and pumped	☐
surged with block and bailed	☐
surged with block and pumped	☐
surged with block, bailed and pumped	☐
compressed air	☐
bailed only 30 minutes	■
pumped	■
pumped slowly	☐
Other surged w/ pump periodically	■

3. Time spent developing well by pumping: 28 min.

4. Total well depth (bgs) (From well construction summary): 69.0 ft.

Measured well depth (Before) (TOIC): 71.5 ft.

Measured well depth (After)) (TOIC): 71.4 ft.

5. Inside diameter of well: 2. in.

6. Volume of water in filter pack and well casing: 22.8 gal.

7. Volume of water removed from well: 160. gal.

Relative recovery rate: _____ ft. per. _____ min.

8. Volume of water added (if any): None . gal.

9. Source of water added: _____

	Before Development	After Development
10 Depth to Water (from top of well casing)	a. 15.52 ft.	15.51
Date:	b. 10 / 3 / 97 (mm dd yy)	10 / 3 / 97
Time:	☐ a.m. c. 3 : 20 ■ p.m.	☐ a.m. 5 : 20 ■ p.m.
11 Sediment in well bottom:	. inches	. inc
12 Water Observations:	Clear ☐ Turbid ■ (Describe)	Clear ■ Turbid ☐ (Describe)
Color	Cloudy	Clear
Odor	None	
Turbidity	Turbid	None
HNu		

Filter Pack Vol. (gallons) $0.16(R^2 - r^2)ls$ = 13.8

Well casing Vol. (gallons) $0.16r^2 l$ = 9.0

Saturated length of sand pack (ft.) (ls) 3.6

Length of water column (ft.) (l) 56.0

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

13 Total suspended solids (500 ml Unfiltered): _____ mg/l | _____ mg

14. COD (250 ml Unfiltered Sulfuric): _____ mg/l (BEFORE) | _____ mg (AFTER)

Time	Gallons Purged	pH	Spec. Cond. (umhos/cm)	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb. (NTU)	DO (mg/L)	Comments
1612	10	7.83	0.034	10.84		Clear		124	0.53	
1616	20	7.32	0.039	10.77		Clear		135	0.00	
1620	30	7.23	0.262	10.73		Clear		55	0.00	
1627	45	7.20	0.182	10.66		Clear		67.5	0.00	
1635	60	7.15	0.389	10.64		Clear		56.8	0.00	
1641	75	7.18	0.384	10.45		Clear		27.6	0.00	
1649	90	7.15	0.389	10.57		Clear/Cloudy		27.7	0.00	
1700	110	7.15	0.387	10.57		Clear		13.1	0.00	
1705	135	7.12	0.391	10.49		Clear		12.6	0.00	
1711	150	7.12	0.392	10.50		Clear		9.4	0.00	
1718	160	7.09	0.395	10.52		Clear		9.1	0.00	

Note: DO = Dissolved Oxygen

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